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THE INCIDENCE OF RURAL PROPERTY TAXATION IN ALBERTA

by

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled The Incidence of Rural Property Taxation in Alberta submitted by Edward O. Asante in partial fulfilment of the requirements for the degree of Master of Science.

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ABSTRACT

Farmers in Alberta have large farm assets which may not be related to current farm income. The measures of tax incidence based on current income and based on an economic concept which recognizes benefits derived from asset holdings are compared to find the effect of the latter economic concept on equality of the tax incidence. The latter concept is adapted from the Weisbrod-Hansen model. It is hypothesized that the incidence of property tax is less regressive when the measure of incidence is based on the economic concept adapted from the Weisbrod-Hansen model.

Information for the study was obtained from records of selected farmers in East-Central Alberta who participated in the 1970 Farm Business Analysis project of the Alberta Department of Agriculture. Supplementary data were obtained from various government departments and also through correspondence with the selected farmers and their municipal offices.

The analyses of the incidence of the property tax paid and the benefit of school expenditure are based on four reference groups--type of farm, location of farm, income and age. The incidence of property tax is the property tax paid expressed as a percent of the income (current) or the economic concept of a specific income group, age group, farm type and location of farm. Gross and net benefits are investigated using two measures of benefits.

The inequality of the incidence of property tax is reduced when the incidence is measured using the economic concept which recognizes benefits derived from asset holdings. The incidence of gross benefit by income based on the latter economic concept is not as markedly progressive as in the case of the current income. It is also observed that the provincial contribution towards financing education (through the School Foundation Program) is an effective tool for achieving income redistribution.

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The writer takes full responsibility for any errors and inaccuracies in this study.

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CHAPTER I

INTRODUCTION

The Property Tax is of importance for a number of reasons. First, it is [illegible]ajor revenue source at the local government level. Secondly, it has effect on the distribution of total taxes paid among income levels. Thirdly, it is important because of the benefits gained from its redistribution of income, and as well, as a cost component of agricultural production.

The primary aim of this study is to investigate the incidence and benefits of rural property in Alberta. The objective of a study of incidence of the tax and benefits derived from the tax paid is to find the equitability of the tax. The concept of equity is a judgement on the tax treatment of individuals--treatment of individuals in equal circumstances and the relative treatment of individuals in unequal circumstances. There are arguements in favour of people in better circumstances paying more taxes, and other arguements in favour of people paying more taxes according to the benefits received.

The benefit concept of taxation may work in the case of user tax. Even here, the concept ignores the idea that the government should support the poor. It also ignores the problem of externalities. By their literacy, people who spend on educating themselves or their wards confer benefits on others. External costs and benefits are also difficult to measure. The incidence of rural property tax in this study is therefore mainly treated according to the ability-to-pay concept.

Current taxation theory regards the imposition of taxes as a tool of income redistribution. As a result the equity yardstick has become very important in current discussion of taxation theory. Tax equity, formerly restricted to the basing of tax payments on income, has now come to be applied not only to income taxes but also to property taxation and, indeed, to the taxation of income from a number of other sources.

The efficiency of property tax to distribute the tax burden equitably has been frequently questioned. The alleged inefficiency of the property tax burden has been attributed to the measurable bases for determining ability to pay taxes. A proper definition of economic base is important in establishing equity both in a vertical sense and a horizontal sense. If property holdings and income are closely related, property could be regarded as a measure of economic power. Otherwise, inequalities in terms of ability to pay would seem to be a feature of the property tax.

The nature of modern economic organization is such that individuals may obtain income through several different methods and channels. There arises the problem of designing the tax and transfer structure so as to give equal treatment to individuals who are in basically equal economic positions but differ regarding the form and time in which incomes are obtained. An income concept which recognizes benefits associated with asset holding will reduce or eliminate the inherent inequalities of the property tax which result when property holdings and income (current) are not closely related. In the case of farm operators, this approach may also account for improvements in the farm operator's economic well-being due to appreciation in real estate values.

An attempt is made to develop an income concept which recognizes benefits associated with asset holdings. In addition to current income, this income concept is used in the tax analysis.

In this study, the incidence of the property tax paid is investigated by income levels, farm types, age groups and location of farm enterprises. An attempt is also made to investigate the incidence of gross benefit and net benefit of the school tax for some of these groups.

It is assumed that property holdings and the income concept developed in the study are closely related. The character of the gross benefits and the net benefit incidence of the school property tax depend on assumptions of the tax incidence and distribution of children aged six to eighteen years by income levels. It is assumed that farm operators in the lowest income levels are lowest and highest in age, respectively, and as such have the least number of children between six and eighteen years.

In rural Alberta, the property tax is primarily a tax on farmland. The determination of the incidence of property tax for the different farm types will throw light on the equitability of the rural property tax for the operators of the different farm types. Farm operators who have the largest farm acreages and also a great percentage of improved land will have larger absolute assessment in dollars.

Where property values are lower, higher tax rates will be required to raise the same revenue as in areas where property values are high. The property values for farm operators located outside the Edmonton-Calgary Corridor are assumed to be lower than property values of farm operators located in the Edmonton-Calgary Corridor. Since the property tax is based on assessed value of property, inequity in the assessment will distort the burden of the property tax. If low-valued property is over-assessed and high-valued property under-assessed, the result will be a disproportionate tax burden on farm operators located outside the Edmonton-Calgary Corridor.

It is assumed that municipalities outside the Edmonton-Calgary Corridor have a lower tax base and will therefore require more revenue from outside sources to finance education unless they pay a relatively higher school property tax. The Provincial School Foundation Program Fund (SFP) is intended to minimize the differences of the school property tax between municipalities.[1] The intention is to make the school property tax equitable. This intention may not be achieved if there are differences in incomes of farmers in different municipalities. For the school tax to be equitable on the basis of ability to pay, taxes as percent of income should be relatively greater for farmers in an area where farm incomes are higher. Similarly, the SFP may also make the property tax burden for farmers in different age levels less equitable. The study throws light on the equitability achieved by the SFP.

A common belief is that acquisition and ownership of farm property increases with age and that the incidence of property tax is greatest for older farm operators. If the belief about the relationship of acquisition and ownership of farm property is true, then the use of an economic base which reflects the true economic power of the farm operator should offset the higher taxes paid. In this situation, the tax burden for farm operators in different age groups should not be different.

---

[1] The Provincial School Foundation Program Fund was established in 1961. Every municipality is required to contribute annually an amount related to its assessment. The 1973 rate was 30 mills. Standard assessment procedures are employed to bring assessments to an equalized or common basis throughout the province. These amounts together with a contribution from general provincial funds, form the foundation fund from which school systems receive the bulk of their revenue. Supplementary amounts can be requisitioned from the appropriate municipalities.

The basis of foundation support is a per-pupil grant, varying according to level of instruction and size of the school district. [Canadian Tax Foundation, 1973, p. 171].

Older farm operators and younger farm operators may have fewer children aged six to eighteen years than middle-aged farm operators. The benefits from that part of the taxes applied to school expenditure for these farmers are therefore relatively lower.

In a study of the equity of rural property taxation, it is important that factors affecting farm real estate prices be investigated. The effect property tax has on farm real estate prices will also give an indication of the character of the property tax. To the extent that there is capitalization of the benefits of lower property taxes into higher farm real estate prices, tax benefits received by owners of real estate for a given reduction in the property tax rate per $1000 of taxable real estate would depend on the magnitude of farm real estate owned. In this case, grain farmers, who have a larger component of taxable farm real estate would receive greater benefits from tax reduction than other farm operators.

A major hypothesis which is tested is that the character of the incidence of property tax based on an income concept which recognizes benefits associated with asset holding is more equitable than the character of the incidence of the property tax based on the ordinary current income concept. Other major hypotheses which are formulated on the basis of the income concept which recognizes benefits associated with asset holdings and are tested are as follows:

1. Incidence of the property tax.[1] The incidence of the property tax by income is proportional. It is relatively greater for grain farmers than for farm operators of other farm types. Farmers located in municipalities outside the Edmonton-Calgary Corridor bear a relatively greater tax burden. The tax incidence is relatively higher for farmers who are fifty-six years old or more.

2. Incidence of gross benefit of school expenditure.[2] The incidence of gross benefit by income levels of school expenditure financed with revenue from school property tax is proportional. The gross benefit from school expenditure financed with revenue from school property tax is relatively higher for farmers who are between thirty-six and fifty years old.

3. Incidence of net benefit of school expenditure.[3] The net benefit from school property taxation by income levels is proportional. The net benefit from school property taxation is relatively higher for farmers who are between thirty-six and fifty years of age.

---

[1] Incidence of the property tax paid is defined in Appendix I.

[2] Incidence of benefit of school expenditure is defined in Appendix I.

[3] Incidence of net benefit of school expenditure is defined in Appendix I.

CHAPTER II

LITERATURE REVIEW

Recent tax studies in Canada have concluded that the most regressive components of the overall tax system are those levied by municipal governments [Gillespie, 1964, pp. 64-66 and Maslove, 1972, p. 75]. Notwithstanding the criticisms levelled against property tax, its importance as a source of revenue on the municipal level has not decreased. Property taxes accounted for approximately 82 percent of all tax revenues of local governments in Canada in 1972.[1]

A defense for the continuance of rural property taxation is that the burden of this tax on lower income groups is offset, at least to a large extent, by the way in which benefits from the tax are distributed [Lerohl, 1967, p. 28]. The Brown Report implied that knowledge about property tax in Alberta is inadequate [Brown Report, 1970, p. 44]. It is stated in the report that:

> ...the Committee recognizes the value of the continuation of its own studies. With more time for collecting and analyzing data, the shares of the tax burdens among areas of the province, sectors of the economy, and among municipalities could be more carefully determined and observed.

The property tax burden for farmers is believed to be different for farmers operating various types of farms.

---

[1] Calculated from data in Provincial and Municipal Finances [Canadian Tax Foundation, 1973, p. 50].

Allen argued that a grain producer who has a larger investment in land assessed for tax purposes ends up paying a greater portion of his income in property taxes [Allen, 1968, pp. 20-21]. He stated that there is little evidence to support this type of inequity. The findings from this study will contribute to the knowledge of the property tax.

In most property tax studies, in order to determine the burden of the property taxation, the taxpayer units were classified into groups. Measurable indicators which have been used to classify taxpayers' ability to pay taxes (and hence the tax burden) are age, location, wealth and income [Bridges, 1968, pp. 14-15 and Maslove, 1972, pp. 7-8]. Taxpayer units in the Canadian studies are described as families and unattached individuals.[1] This approach of treating families as taxing units would be more appropriate when incomes of other members of a family are known or can be estimated. The approach is also important in a situation where the overall tax structure (income, corporate, selective, property and other taxes) is considered in tax incidence studies.

Bridges classified the family units according to age of the family head and what he described as relative economic status. The relative economic status used by Bridges is the welfare ratio, defined as the ratio of before-tax (before public transfer) income to the basic income needs of the family unit [Bridges, 1968, pp. 61-69]. By this approach, age of the family head and family circumstances are considered in the tax incidence. Most other studies on tax burden estimation use income as the measurable base to classify the taxpayer units into groups [Gillespie, 1964, pp. 2-3; Goffman, 1962; LeRoy and Brockschmidt, 1972; and Maslove, 1972]. It has been suggested that the definition of income used in the studies of the property tax burden affects the results of such studies.

---

[1] The family unit is the basic unit defined as a "group of individuals sharing a common dwelling unit and related by blood, marriage or adoption"; and unattached individuals are defined as "persons living by themselves or rooming in a household where they are not related to other household members" [Statistics Canada, Income Distributions by Size in Canada, 1969, Cat. No. 13-544].

Income Concept

It is noted that studies directly measuring the correlation between property taxes and current income are likely to be biased toward regressivity. A possible reason for obtaining these results is that property holdings and current incomes from other sources are inversely related, e.g., that eventual benefits of property ownership are accepted by many as a realistic substitute for current income. Zubrow states that wealth or property holding may or may not reflect current taxpaying ability [Zubrow, 1960, pp. 163-230]. Studies using current income in the analysis of the burden of property tax invariably show the property tax as a regressive tax [Goffman, 1962 and Jensen, 1931, p. 532]. A probable reason for obtaining these results may be that property holdings and current income are not closely related.

Allan also cautions that money income is not by any means the only or even the best measure of the ability to pay. Assets, he stated, may produce little income but may certainly improve the owner's ability to pay taxes [Allan, 1971, pp. 131-133]. Assets reduce the owner's need to set aside something out of current income for retirement. The asset owner can also borrow money on the strength of his assets. Thus, current ability to pay is affected by the expected future ability to earn income. This knowledge should be incorporated in a definition of income to measure the equity or burden of the property tax.

Where an attempt is made to use an income concept which approaches annual lifetime income (or permanent income), the property tax does not seem to be regressive.[1] Property tax seems to be proportional or even progressive in some studies [LeRoy and Brockschmidt, 1972 and Tobier, 1968]. As a result, some recent studies use an income concept or economic base which gives a more realistic picture of the economic position of taxpayers [Carlin, 1973, pp. 63-68].

---

[1] Annual lifetime or permanent income is the income an individual expects to receive over a long period of time. The broadest definition is lifetime income expressed in terms of annual averages [Carlin, 1973, p. 62 and Netzer, 1966, pp. 62-65].

Modigliani and Brumberg state that:

> ...the rate of consumption in any given period is a facet of a plan which extends over the balance of the individual's life, while the income accruing within the same period is only an element which contributes to the shaping of such a plan. Also, as a result of the presence of uncertainty, it is necessary or at least cheaper, to have equity in certain kinds of assets before an individual receives services from them [Modigliani and Brumberg, 1969, pp. 99-140].

Modigliani and Brumberg found that observed asset holdings reflect the life plan of the individual which in turn depends on income and income expectations. Results of Petersen's study suggest that there is significant difference between marginal propensity to consume out of permanent income and the marginal propensity to consume out of measured or current income [Petersen, 1972, pp. 403-407]. All this evidence points to the undesirability of using current income in property tax analysis.

Farming requires a great deal of investment in land, land improvements, equipment and machinery before one can receive income from the farming operation. This knowledge makes it more likely for the property tax to be regressive if the income base or economic base does not take account of the wealth of farmers. Carlin has shown that in the United States, the farmer's net worth is twice as great as the non-farmer's [Carlin 1973, pp. 63-68].

As pointed out by Friedman, lack of data necessitates the use of current receipts as income [Friedman, 1969, pp. 141-158]. Several methods of computing "permanent income" from current income have been employed by researchers. Some of these methods include: (i) that proposed by Friedman --a weighted average of current and past incomes with the weight exponentially declining and letting the data determine the number of years; (ii) using simple average of past and current incomes; (iii) use of weighted averages and letting the data determine the weights; and (iv) use of weighted past and current incomes where the weights are arithmetically decreasing [Taubman, 1965, pp. 38-43].

Each of these methods has its advantages and disadvantages. The selection of a method will depend on the data available. A major problem with all the methods listed above is either the determining of the weights or the reliability of the weights. One disadvantage of using historical series data is the difficulty of computing accurate price indices through time, since the values of machinery and other farm inputs of some years ago are not equivalent to comparable items today ["Financial Requirements of Agriculture", 1964, pp. 3-4]. Farmers must also finance their businesses in terms of current, rather than fixed, dollars.

The difficulty in measuring permanent income has led to the use of proxies for permanent income. Some of these proxies are value of housing and annual income series as a proxy for wealth [LeRoy and Brockschmidt, 1972].

The use of the income concept in tax incidence analysis arises from the belief that income gives an indication of a person's ability to pay taxes. Goffman defends the use of income base since all taxes are paid out of an individual's income [Goffman, 1962, p. 1]. If by this statement Goffman is referring to current income, which he is, then his defense of the current income is weak. As stated earlier, current income alone may not give a true indication of the economic power of the taxpayer. Net income, as compared to gross income, is a more realistic measure of the ability to pay taxes. It reflects net receipts currently available for essential needs and tax payments. Gross income may not be a very useful indicator of the taxpayer's ability to pay taxes since it includes cost components.

Approaches to Develop an Improved Income Concept

Gillespie used an improved income concept in his tax study. He used family money income and "broad income" and "adjusted broad income" concepts.[1] These income concepts are in line with his definition of taxpayer units. Maslove stated that: (1) the income concept represents permanent flow of services and does not include one-time transitory or windfall elements; (2) the chosen income concept should include all types of income--monetary and non-monetary. Maslove used broad income and full income.[1] Gillespie's and Maslove's comprehensive estimations of income are attempts to derive an income base which will be a true economic power of the taxpayer units. Analysis of the municipal tax burden using both the broad and adjusted broad income indicated that the property tax was regressive. However, in Maslove's study, the inequality was lower when full income was used.

---

[1] Broad income is family money income minus transfer payments to persons. Adjusted broad income is broad income minus total tax plus government expenditure on goods and services and transfer payment of persons.

The Royal Commission on Taxation criticised the use of wealth as an income base. Wealth, the Commission Report states, does not take into account the human capital [Report of the Royal Commission on Taxation, 1966, p. 241]. A measure which takes account of both human capital, by way of the income component, and wealth, is obtained by a method used by Weisbrod and Hansen [Weisbrod and Hansen, 1968, pp. 1313-1318]. This method is a combination of income and net worth. In this method, current net worth is converted into annuity to yield a lifetime flow. The annuity is then added to the current income to give a measure of well-being in period t.

$$Y^* = Yt + NWt.An$$

---

[1] Maslove's definitions of broad income and full income approach those of Gillespie. See footnote, page fourteen above.

Y* = measure of economic well-being in time period t

Yt = current money income

NWt = current net worth

$An = \frac{r}{1-(1+r)^{-n}}$, the factor which converts dollars to an n year annuity at a given rate of interest r, and n is the life expectancy of the family beyond time period t

Carlin and Reinsel applied the Weisbrod-Hansen model to the farm sector to determine the effect of wealth on the distribution of economic well-being [Carlin and Reinsel, 1973, pp. 38-43]. The economic well-being of U.S. farm families was improved by using Yt*. In another study by Carlin, using the Weisbrod-Hansen model, the median economic well-being measure for U.S. farm families increased by $1,900 as compared to a measure of current income [Carlin, 1973, pp. 63-68].

In a study considering the economic measure for farmers, it is important to consider net worth for the following reasons: (1) farm families save and reinvest a large portion of their income in the farm business (accounts partially for farmers possessing twice as much net worth as non-farmers), and (2) farm families might have benefitted from capital gains on farm real estate.

If the economic well-being measure obtained by the Weisbrod-Hansen method is to be treated as a permanent income, then there should be no distinction between productive and unproductive resources as employed in the Carlin and Reinsel study [Carlin and Reinsel, 1973, pp. 38-43]. The possession of an "unproductive" resource (e.g., a house) affects the permanent income of the operator. An operator who does not own his house will spend money on house rent. This money, had the operator owned the house, could be used to acquire "productive" resources.[1]

A major objection to the use of the Weisbrod-Hansen model in estimating permanent income is the fact that the results are affected by the rates used in calculating the return on capital (which is subtracted from the current income) and the interest rate used in calculating the annuity. As long as the rate of return on capital and the interest rate used in the annuity have been carefully selected, the Weisbrod-Hansen method may give an economic measure which may be a good indication of the permanent income of the operator.

The Tax Burden and the Measure of Incidence

Effective Tax Rates

The incidence of burden of a tax is analysed in progressive, proportional or regressive terms. These terms may be tax rates--the tax payments expressed as percentage of income. This measure has been used by Gillespie and Netzer, among others [Gillespie, 1946, p. 6 and Netzer, 1966, pp. 32-59]. Allan defines:

---

[1] Productive resources here refer to capital resources used on the farm and excludes a house and other assets for personal use.

> progressive tax as one which takes an increasing proportion of income as income rises; a proportional tax takes a constant proportion of income; and a regressive tax takes a declining proportion of income as income rises [Allan, 1971, pp. 28-30].

Table 2.1 indicates that implicit in the definition of progressive tax is the proportion of income going in tax rises with income. Figure 2.1 illustrates diagramatically the principle of progression, proportion and regression.

TABLE 2.1

TAX LIABILITY

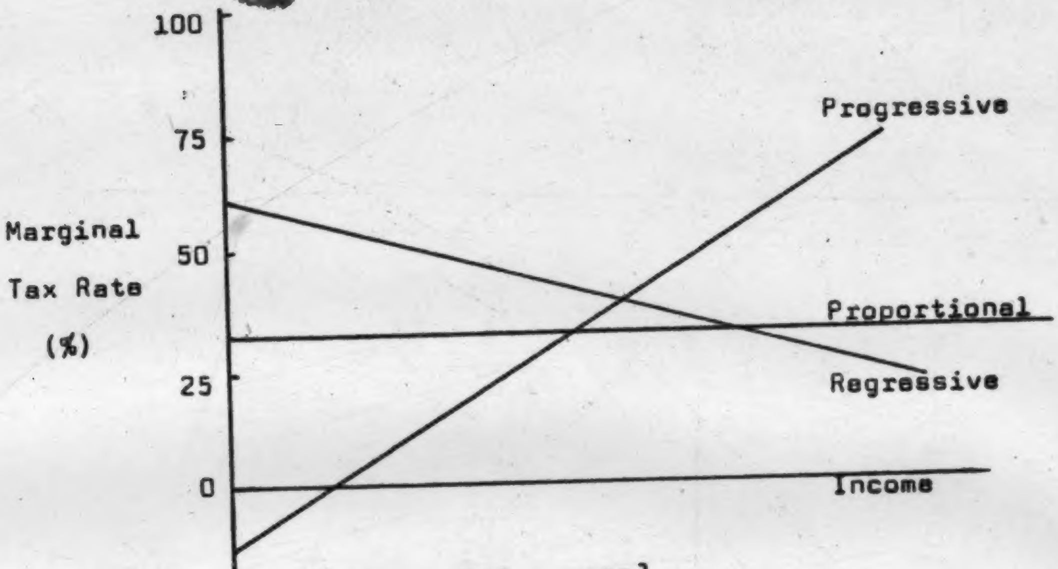
Income	Regressive		Proportional		Progressive	
($)	($)	(%)	($)	(%)	($)	(%)
10,000	100	1	100	1	100	1
100,000	200	0.2	1,000	1	2,000	2
1,000,000	300	0.03	10,000	1	30,000	3

Lorenz Curve

Musgrave used the Lorenz curve to measure the incidence of the tax or the distributional changes resulting from the tax.. In Figure 2.2, ODB indicates the initial distribution of income. Assuming OGB is the resulting distribution of income after imposition of a tax, the ratio of OGBA/ODBA measures the incidence or distributional change

FIGURE 2.1

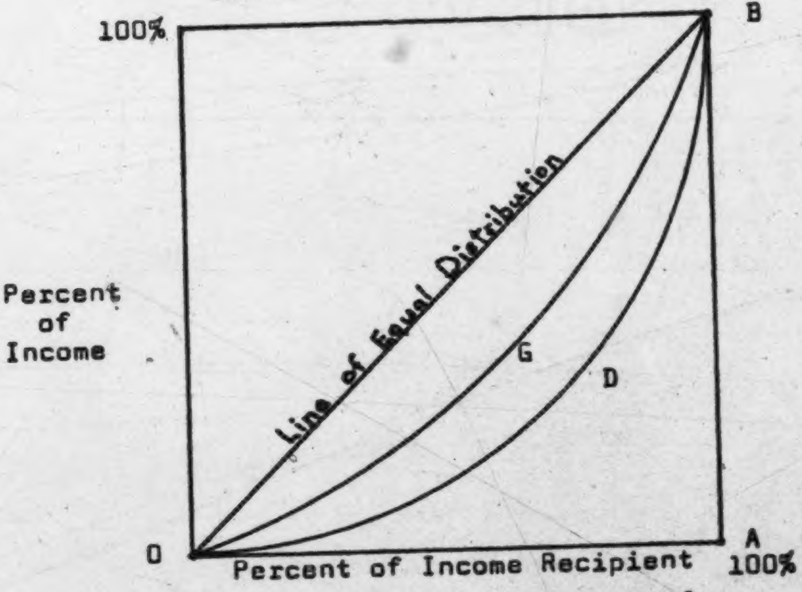
DIAGRAMATIC PRESENTATION OF PROGRESSIVE, PROPORTIONAL AND REGRESSIVE TAXES



Source: [Allan, 1971, p. 30].

FIGURE 2.2

CHANGE IN INCOME DISTRIBUTION



Source: [Musgrave, 1959, pp. 223-225].

that results. If the ratio exceeds 1, the overall incidence is progressive; if it equals 1, it is proportional or neutral; if it is less than 1, it is regressive [Musgrave, 1959, pp. 223-225]. Musgrave's measure depends not only on the structure of the statutory tax rates but also upon the level of yield, the distribution of income, and the entire adjustment process that results. Musgrave's approach would be ideal in a situation where the overall fiscal measures for the population are investigated. But in a situation where only one tax and a small sample of taxpayers are considered, measures of progression can be investigated by the appearance of the rate structure only.

Income Elasticity of Taxation

Another measure of the progression of the tax which has been used is the income elasticity of taxation measure. The income elasticity measure has been used by LeRoy and Brockschmidt, and Maslove [LeRoy and Brockschmidt, 1972, and Maslove, 1972, pp. 72-72]. LeRoy and Brockschmidt's approaches involve estimating the income elasticity by regressions of housing value on income and tax rate on income. Maslove's approach involves measuring the income elasticity of taxation for consecutive income levels.[1] The income

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[1] $$Uij = \frac{Rj - Ri}{\frac{Rj + Ri}{2}} : \frac{Yj - Yi}{\frac{Yj + Yi}{2}} = \frac{Rj - Ri}{Rj + Ri} \times \frac{Yj + Yi}{Yj - Yi}$$

Where:
R = effective tax rates
Y = mean incomes of the classes

elasticities between different income levels seem to give a better picture of the tax incidence among the different income levels. Taxation is proportional between two income levels if the coefficient of the income elasticity is zero. Taxation is progressive if the coefficient of income elasticity is greater than zero and regressive when the income elasticity is less than zero. The larger the absolute value of the income elasticity of taxation, the more progressive (if value is positive) or regressive (if value is negative) are the taxes over that income interval.

Limitations of Measuring Tax Incidence by Income Classes

The method of measuring tax incidence for each income class is limited by the aggregation effect. Within each income level significant variations exist in actual incidence of specific taxpayer units--family size, occupation, etc. A recent study suggests that the low level of income of a one-person family is approximately $1,800 and for the seven-person non-farm family with five children under age eighteen, it is approximately $6,200 [National Advisory Commission on Rural Poverty, 1968]. Any interpretation of the results of studies of tax incidence which did not account for some of

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(cont'd.) j and i indicate the higher and lower income levels, respectively. If taxation is proportional between two classes (i.e., if effective rate does not change as income rises), the value of the coefficient is zero ($Uij = 0$).

If $Uij > 0$, the tax is progressive.

If $Uij < 0$, the tax is regressive.

The larger the absolute value of Uij, the more progressive or regressive are taxes over that income interval [Maslove, 1972, pp. 72-73].

these variations should be limited to the "average family" in income level [Goffman, 1962, pp. 1-73 and LeRoy and Brockschmidt, 1972]. Another limitation which should be noted is that the income levels which are formed arbitrarily may affect the results. The results should then be interpreted with respect to the particular income levels used.

The first limitation pointed out above illustrates the importance of limiting the study of tax incidence based on income levels to areas and taxpayer units which have similar socio-economic characteristics. If areas and taxpayer units which have similar socio-economic characteristics--such as all taxpayers located in a limited geographic area and having the same occupation--are used in tax incidence investigation, it may be hypothesized that economic variables in one occupational category in a limited geographic area are relatively homogeneous.

Assessment and Assessment Ratio

Underassessment, non-uniform assessment, and overassessment have been found to be among the common faults of property taxation [Lynn, 1969, pp. 23-33]. Infrequency of assessment also produces inequalities. The value of farm real estate does not remain the same over the years. In 1950, the average value of agricultural real estate was $33 per acre, while the value was about $67 per acre in 1970

[Askin, 1952 and Miller and Pattison, 1972, pp. 1-30].[1] The property assessment system, it is believed, does not represent current market values of properties [Lerohl, 1967, p. 25]. In California, assessors are required to include the full cash value of the property on the routine notice of an assessment increase. This measure is intended to give property owners a basis to lodge an appeal if they so desire [Corusy, 1969, pp. 69-70 and Rostvold, 1967, p. 105].

The assessment ratio may be based either on _sales ratio_, _appraised ratio_ or _use ratio_. Ideally, the assessment ratio should be based on sales data. Ablasser used sales data to find the assessment ratios for areas in the Prairie Provinces [Albasser, 1969, pp. 200-214]. The assessed value of the holding is divided into the market price of the property. In Alberta, the ratio increased from 4.40 in 1963 to 6.18 in 1967. This indicates that the market price of property holdings increased more than the assessed value of the property holdings over the five year period [Ablasser, 1969, pp. 200-214]. The relative values between farms are, however, important.

Some problems inherent in this approach depend on the number of farm real estate sales in the locality and the problems of eliminating non-market sales.[2] The easy availability of loanable funds to purchase farm real estate may also result in buyers paying a higher price for the property. Ablasser obtained records of farm sales mainly from the Farm Credit Corporation [Ablasser, 1969, pp. 2-3]. It would be interesting to identify the influence of this source of farm sales on the ratio of market values to assessed values.

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[1] The 1950 value was based on only improved farmland and buildings, while the 1970 value was based on all farmland (improved and unimproved) and buildings. The 1970 value is thus likely to be underestimated as compared to the 1950 value.

[2] Non-market sales--for example, sales between father and son and sales under pressure of bankruptcy, etc.--may not be under the market price of the property. A desire to acquire a particular property for all sorts of reasons may result in a buyer paying more than the market value of the property.

An alternative method of assessing real estate is by basing assessment on the current use value of the property instead of on market value [Schoeplein and Schoeplein, 1972, pp. 679-682]. This method, it is believed, would not put undue tax burden on farmers whose land lies in an area mature for real estate development. Recognized limitations of this assessment procedure are: (1) all farm acreage may not have the same use value and (2) all farm land in an area may not be in equal demand for development. As pointed out by Barlowe, the increase in land values may not be restricted to areas near urban centres, but may also be found in other areas [Barlowe, 1967, pp. 83-100].

If non-market farm sales could be eliminated from farm sales records used in assessment studies, the ratio of market price to assessed value of property may give a better picture of assessment inequities.

Gross Benefit and Net Benefit Incidence

The difficulty of measuring the benefits of taxation (tax revenue) has led several property taxation studies to ignore the benefits from tax revenue [Goffman, 1962, pp. 1-73 and LeRoy and Brockschmidt, 1972]. Some studies attempt to investigate the distribution of overall benefits of tax revenue [Gillespie, 1964, pp. 88-153]. Other studies isolate some benefits of tax revenue and analyse them to find the relative benefits for different income levels [Jansson, 1966, pp. 1-82 and Mapp and Boisvert, 1973, pp. 1-49].

Measures of benefits which have been used are "value" or "cost" of the services received. These costs are related to a unit of service. The determination of a unit of service received by each income group enables the gross benefits received by the group to be calculated [Gillespie, 1964, pp. 88-153]. The difficulty with this approach is the reduction of some services (e.g., protection by police) to the different income groups.

Tucker distributed some of these non-allocable benefits on a per capita basis and others on the basis of ownership of property [Tucker, 1953, pp. 518-535]. This approach is questionable since it assumes that both the poor and the rich receive the same benefits. It is probably true that the rich receive more property protection and also use the roads more than the poor. The distribution of benefits on the basis of ownership of property also assumes that property ownership is positively related to income. This assumption may be true if the annual lifetime income derived from the property has been used in the study. Here external benefits are ignored.

Problems of Distribution of Tax Benefits and Attempts to Measure Benefits

Gillespie analysed tax benefits by means of a measure called the effective expenditure incidence (assuming that expenditure is a benefit to the taxpayer)[Gillespie, 1964, pp. 88-153].[1] He observed that overall provincial and local expenditure for the low income bracket (under $2000) was 63.6 percent of income. It dropped sharply through the higher income brackets to 11.5 percent for the $10,000 and over level. Education expenditure was 18.3 percent for the under $2000 bracket, reducing to 2.5 percent for the over $10,000 level [Gillespie, 1964, p. 143]. In the Gillespie study, public income expenditure on education was distributed to taxpayer income classes on the basis of student distribution among the income classes. This approach does not account for the distribution of the external benefits of education. However, the fact that a study by the Economic Council of Canada suggests that the internal rate of return from high school education for the individual exceeds that for society makes the investigation worthwhile

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[1] Effective expenditure incidence is the cost of providing public expenditures for each income level expressed as a percent of the mean income for the income level.

[Economic Council of Canada, 1971, p. 207].[1] The interpretation of the result, on the other hand, can be limited to the private benefits of education. Another limitation of Gillespie's approach is the assumption that benefits to students are transferable to their parents. This assumption may be pardoned by the belief that parents attach economic and psychological value to financing their children in school. Studies also indicate that income increases with amount of education acquired [Economic Council of Canada, 1971, p. 198 and Miller, 1960, pp. 962-985].

The distribution of education benefits (in these studies) would have been ideal had the benefits been distributed by the amount of education for the children in each income group. Miller's investigation seems to indicate that the amount of education received is relatively higher for children of higher income levels [Miller, 1960, pp. 962-985]. Janssen's study suggests that farm children in the low income bracket received less formal education than those in the high income levels [Janssen, 1966, pp. 41-49]. However, since the difference in amount of education received is so small the results of studies treating expenditure per pupil as independent of income may not change.

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[1] The internal rate of return is a type of benefit-cost calculation. The internal rates of return associated with education represent the discounted rates at which the present values of the calculated benefits equal the present values of the costs. The internal rates from high school education on the Prairies in 1967 were:

Society 7 percent; Individual 9 percent.

Bridges also analysed the distribution of current benefits among family income levels. He measured benefit rate as the ratio of a class transfer payment (expenditure benefit-transfer payment) to its adjusted before-tax, before-transfer income. According to Bridges' approach:

> If on an individual basis the link between individual taxes on one hand, and individual benefit payments on protection on the other, differs from a _quid pro quo_ link, then the tax measure has a significant current distribution effect [Bridges, 1968].

He observed that the benefit rate was pro-poor.

Mapp and Boisvert's study of the benefits and burdens of school finance indicated that the method of financing a public school in New York State transfers the net benefits from the low income class to the middle and higher income classes [Mapp and Boisvert, 1973, pp. 1-49]. They used a measure of _expenditure benefit-cost_ (EB/C) or _expenditure benefit-burden_ (EB/B) ratios. If the ratio for an income class is less than one, the tax transfers benefit from that class. If the ratio is one, there is no benefit transfer. If the ratio for an income class is greater than one, the tax transfers benefit the income class. The Bridges and Gillespie methods fit in with the measure of tax burden discussed in connection with the ability-to-pay concept.

Measurement of Net Benefits (or Net Incidence)

Gillespie went further than analysing the tax burden and benefits; he investigated the net incidence of taxation for each income level. Gillespie's effective net fiscal incidence was clearly pro-poor [Gillespie, 1964, pp. 179-189]. Effective net fiscal incidence (benefits) was measured as the difference between expenditures received and taxes paid, by income level, expressed as a percentage of broad income or adjusted broad income. The net benefit, as related to the income classes, decreased as income increased until the upper income ranges where it became a net burden. The federal pattern of net fiscal incidence was more sharply regressive (or "favorable to the lower income brackets") than the provincial and municipal pattern. He attributed the difference in regressivity to the concentration of social welfare public expenditures on the federal level. The other probable explanation may be that the lower income brackets pay far more property tax than is their due share. Gillespie determined the relative effective net fiscal incidence under the assumption that benefits from general expenditures are proportional to income. This assumption, as explained elsewhere, may be questionable.

Bridges observed that net benefit was positive for the lower non-aged welfare class and negative for higher classes [Bridges, 1968]. His measure of net benefit rate is similar to Gillespie's. The difference is in the interpretation of net benefit. It is a ratio of a class benefit minus tax to its adjusted before-transfer income. Here, the benefit is interpreted as progressive, proportional or regressive when the benefit rate decreases, remains constant or increases, respectively, as the welfare ratio increases. This interpretation of the character of the benefit is contrary to Gillespie's interpretation.

Gillespie defines benefit as "progressive" when the benefit rate increases as the income level increases [Gillespie, 1964, p. 148]. As pointed out by Bridges, Gillespie's definition of benefit may confuse the reader. Since a tax system with a progressive benefit and a progressive tax can have a regressive net benefit, he argued that if tax benefits are treated as negative taxes, then one should call a benefit progressive when the benefit rate decreases as the income increases. It appears that Bridges' interpretation of benefit and net benefit is more meaningful.

In a study by Tobier, it is observed that the benefits incidence by income levels are clearly pro-poor while the net incidence is moderately in favor of the lower income levels [Tobier, 1968]. His study shows that the analysis of tax burdens and benefits alone does not give the whole picture of the tax system. Net incidence was calculated by Tobier as differences between "benefits" on the one hand and taxes on the other.

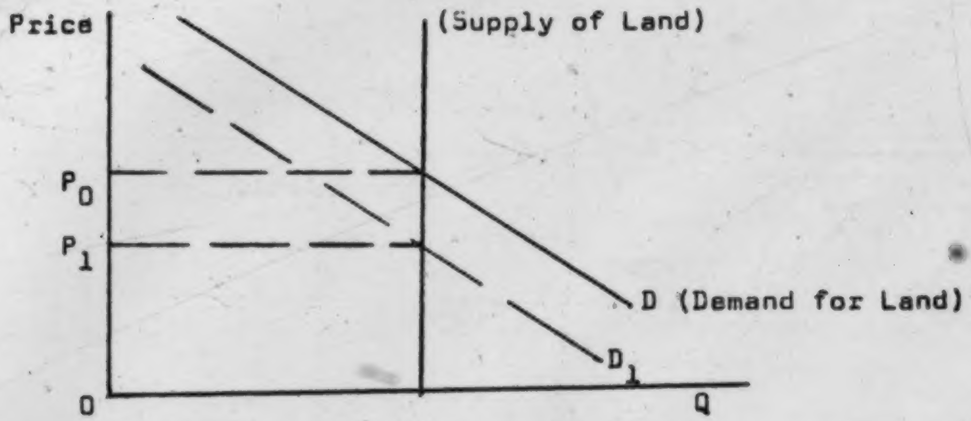
Property Tax and Farm Real Estate Prices

In any study of the tax burden, it is important to find whether the taxpayer upon whom the tax is assessed is the one who pays the tax. That is, any possibility of shifting must be investigated. Theoretical considerations would indicate that a tax on land in perfectly inelastic supply, i.e., unimproved land, would be fully capitalized into lower land values.

In Figure 2.3, a tax on unimproved land lowers demand for land from D to D_1 and the price from P_0 to P_1. Improvements on farmland make farm real estate supply less than perfectly inelastic.

FIGURE 2.3

CAPITALIZATION OF LAND IN PERFECTLY INELASTIC SUPPLY



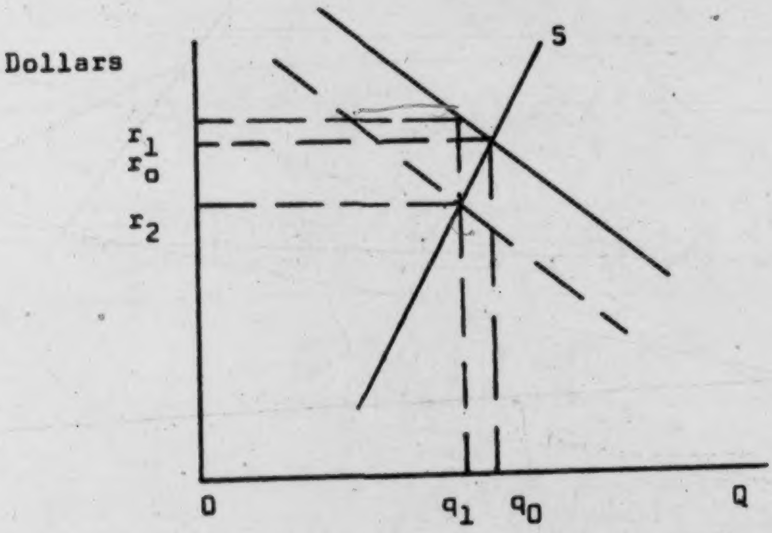
Source: [Pasour, Nov. 1973, p. 550].

The effect of increase of property tax on a farm real estate supply which is less than perfectly inelastic is illustrated in Figure 2.4. In this situation, a tax on land will not be fully capitalized into lower land prices. In Figure 2.4, the demand curve is lowered from D to D_1

with the tax resulting in the fall of quantity of developed land from Oqo to Oq_1. There is a slight increase in the annual rental value of land from Oro to Or_1 with this portion of the property tax being shifted. A greater portion of the tax (Oro less Or_2) is capitalized into lower property values as long as supply is quite inelastic.

FIGURE 2.4

EFFECT OF A TAX ON LAND WHEN SUPPLY OF LAND IS NOT PERFECTLY INELASTIC



Source: [Pasour, Nov. 1973, p. 550].

Since prices of farm products in most areas are not determined locally, but by the larger national and international markets, several studies assume that an increase in a tax cannot be shifted forward in the form of higher product prices [Pasour, Nov. 1973, pp. 549-556 and Seligman, 1969, pp. 255-275]. Pasour regressed the value of farm real estate on a county basis for North Carolina using the tax rate and four categories of explanatory variables expected to be associated with changes in prices of farm real estate. The four explanatory variables were related to agricultural productivity, farm size, urban influences and recreational demand. Results of Pasour's study suggest that long-run capitalization of property tax differentials on farm real estate in North Carolina do occur. When a 5 percent discount rate and the tax rate (plus the increase in tax rate) is used in discounting the real estate value, the resulting real estate value suggests that property tax differentials in North Carolina are more than fully capitalized. When Pasour adjusted the discount rate to take account of annual appreciation in farm real estate values, there was still a substantial capitalization of the property tax increase in the form of depressed property values.

What becomes obvious in Pasour's study is that the extent of capitalization will depend on the discounting rate used. Reynolds and Timmons also noted the limitation imposed by choice of capitalization rate [Reynolds and Timmons, 1966, pp. 342-350]. This limitation should always be kept in mind in the interpretation of the results of such studies.

Summary of Literature Review

Evidences have been cited to illustrate the importance of the property tax in Alberta and also the need for this study. Ways of grouping taxpayer units for tax burden studies have been discussed. A major issue which comes out in the review of the economic base to be used is the measurement of the equitability of the property tax.

From the discussion, the use of current income is questionable and is thought to account for the regressivity of the property tax in several studies. Methods to compute improved income concepts have been discussed. There are limitations associated with each approach, but the use of the Weisbrod-Hansen model appears to be the best, especially when the investigation of the tax incidence is restricted to farmers.

Among the alternative methods of measuring the tax burden discussed are *effective tax rates*, *the Lorenz curve*, and *income elasticity of taxation*. The use of each of these methods will depend on the availability of data and the purpose of the study. For a small number of observations, the effective tax rate measure of the tax burden may be the best.

Assessment contributes to the equitability (or otherwise) of the property tax. Ratio of market price (sales) to assessed value of property may be a better indicator of equality of assessment if non-market sales could be removed.

Methods used by various authors to measure the gross and net benefits are: (1) a. The cost-benefit approach where the benefit is expressed as a ratio of the burden or cost (i.e., the tax paid for the provision of the service); b. net benefit--the difference between benefit and cost expressed as a ratio of the cost; and (2) a. where the benefit is expressed as a percentage of income-gross benefit incidence; b. the difference between benefit and cost expressed as a percentage of income-net incidence of the tax. Major limitations associated with the determination of the tax benefits cited are the inability to measure and distribute external benefits and the manner in which education benefits are distributed. However, other evidence cited minimizes these limitations.

A review of results of studies investigating the relationships of property taxes and farm real estate prices illustrates the importance of the effect of property tax on the burden and benefit of the tax for farm operators.

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CHAPTER III

METHOD OF STUDY

Area and Scope of Study

The area of investigation covers the eastern half of the province between two east-west lines drawn through the Municipal Districts of Sturgeon (M.D. 90) and Foothills (M.D. 31) and bordered on the west by the Edmonton-Calgary Corridor (ECC). "Municipalities" as used in the study refer to both counties and municipal districts.

The study area is restricted in order to obtain a geographic area where farm characteristics such as farm size, and enterprise mix are relatively homogeneous. Unavailability of data for the individual farm operators limited the parts of the study investigating the burden of the property tax incidence, gross benefits and net incidence of the school property tax to only one year--1970. The study as a result is devoid of the disadvantages associated with the use of time-series data--for example, the problem of bringing dollar values of agricultural machinery for different years to the same value ["Financial Requirements of Agriculture", 1964, pp. 3-4].

The data for investigating the burden of the property tax incidence were obtained for sixty-three farm operators located in fourteen municipalities. The fourteen municipalities comprise nine counties and five municipal districts. Forty of the sixty-three farm operators are located in the nine counties and the remaining twenty-three are located in the five municipal districts. All the farm operators are individual operators. Partnerships and corporations were eliminated from the sample.[1]

Five operators had an agricultural production value of less than $15,000 ($6,025, $9,305, $13,691, $14,341, and $14,898, respectively). All other farm operators had an agricultural production value of over $15,000. Considering the high value of agricultural production or operator's farm receipts, the individual farmers used in the study can be assumed to be full-time farmers--farmers who virtually (or at least potentially) depend solely on farm income.

The data for investigating the factors affecting farm real estate prices were based on data for thirty-one municipalities in the study area. County of Strathcona and the Municipal District of Sturgeon were excluded in this phase of the study. County of Strathcona was removed because the number of agricultural sales used in the calculation of farm real estate per acre were few. A similar reason accounted for the exclusion of the Municipal District of Sturgeon. The investigation of school expenditure per pupil for the municipalities was based on data for thirty-three municipalities (including County of Strathcona and the Municipal District of Sturgeon) in the study area.

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[1] Respondents reporting their ages stated the ages of other members if the farm organization was either a partnership or corporation. This information was used to eliminate the partnerships and corporations.

Sources of Data

The data for the study were mainly obtained from the records of Alberta Department of Agriculture, Statistics Canada, Alberta Department of Education and Alberta Department of Municipal Affairs. Other data were made available through correspondence with individual farm operators and municipal offices in the study area.

The Farm Business Analysis (FBA) records of individual farm operators for 1970 (which formed the major data base for the study) were obtained from the Farm Management Branch, Alberta Department of Agriculture. See Appendix II for part of the FBA data compiled for an individual farmer. Permission was first sought from the farm operators regarding the use of their FBA data and also to obtain records of their property tax payments and assessments from their municipal offices.[1]

Through letters the individual farm operators were requested to give information on the number of children who were in either elementary or high school in 1970 and 1971.[2] The farm operators also supplied information on their own current (i.e., 1974) ages.

Number of children in school, total school operating expenditure, and total mill rates for school purposes[3] in 1970 and 1971 for each municipality were taken from the

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[1] In the FBA records, property tax payments were combined with insurance payments and other miscellaneous expenses in Farm Overhead Expenses.

[2] That is, children between ages six and eighteen.

[3] Sum of mill rates for the Foundation Fund Program and the Supplementary School Requisition.

1970 and 1971 annual reports and statistical supplements of the Alberta Department of Education and the Alberta Department of Municipal Affairs. Other information obtained from municipal statistics were population, total assessment and land assessment for the municipalities.

Prices of farm real estate per acre for the municipalities for 1970 and 1971 were obtained from the Resource Economics Branch, Alberta Department of Agriculture [Miller and Pattison, 1972]. Value of farm production per acre for each municipality was calculated from information contained in the 1971 Census of Agriculture: Alberta [Statistics Canada, 1971 Census of Canada, Agriculture: Alberta, 1973]. Life expectancy tables were obtained from the Financial Life Assurance Company.

Income Concepts Used in This Study

Two income concepts are used. The first is Income I, which is current income. It does not account for the increase in economic power gained from appreciation in value of farmland, machinery and buildings. The fixed cost nature of property tax payments and disproportionalities between income and the value of productive assets cause difficulties in interpretation of the incidence of the tax relative to current income.

Consequently, a combination of the current income and a benefit flow from ownership of farm assets is more appropriate for the analysis of tax incidence. This second income concept is a derived annual lifetime income and is referred to as Income II in this study. Income II combines Income I with an annuity of operators net worth.

Derivation of Income I

Income I is net farm income minus opportunity cost of capital. Net farm income is defined by the Alberta Department of Agriculture, Farm Business Analysis, as the return to the farm operator and unpaid family labour, management, and equity capital. (Refer to Appendix II for details of derivation of net farm income.) If a farmer's current income is to be made comparable with incomes of other people, then the opportunity cost of capital (return to capital) should be subtracted from his net farm income.[1]

The rate of return is intended to be what the average farm operator might be willing to take. Analysis of the FBA data for 1970 indicated a 4.9 percent return to equity (residual return to equity).[2]

A return of 4.5 percent on a farmer's total net worth is subtracted from his net farm income to give Income I. The return of 4.5 percent is relatively lower than return on other long-term (non-farm) investments. The lower value is used on the assumption that (1) farmers will take lower returns in the hope that the value of their properties will appreciate in value--benefit from appreciation of property values will outweigh the benefits foregone by taking a lower return on net worth; (2) farmers' preference for farming (as a way of life) to other occupations may induce them to take a lower return on net worth.

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[1] The method of deriving Income I assumes that farmers deduct opportunity cost from their net farm income. Should this assumption be removed, the measure of ability-to-pay in the lower income levels will be higher and also a lower percentage of farmers will fall in the lower income levels.

[2] The equity here is the operator's net worth in the farm business. 91.30 percent of the total net worth of the sample operators in this study is in the farm business.

Derivation of Income II

Income II (annual lifetime income) is derived from the Weisbrod-Hansen model:

$$Yt^{*} = Yt + NWt.An$$

where Yt* is the measure of economic well-being, expressed by Income II, in the time period t. Yt is Income I as defined above; NWt is the farmer's net worth and is defined in Appendix II.

$$An = r/1 - (1 + r)^{-n}$$

This annuity factor converts $1 to an n year annuity at a given rate of interest r, where n is the life expectancy of the farmer beyond time period t.[1]

Unlike the Carlin study where the expected life of the spouse was used, the expected life of the farm operator was used in this study. This approach was adopted on the assumption that economic activity centered on the farm operator. The expected life, n, of the farm operator was based on the operator's age in 1970. An annuity interest rate of 7.29 percent was used. This annuity interest rate is the mean of the average bond yields for 1970 [Bank of Canada, November 1970, p. S52].

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[1] As explained by Carlin, the annuity formula gives more weight to net worth as the age of the family head increases. An older individual can enjoy a higher level of consumption from a given net worth over the remaining lifetime than a younger individual [Carlin, 1973, p. 69]. A farmer's total current net worth is as used since Income II is intended to reflect annual lifetime income. A limitation with the Weisbrod-Hansen method used in deriving Income II is the assumption that after a farmer's death, he has no assets left. But it should be pointed out that a farmer may leave a portion of his real estate for estate purposes.

Criteria for Classifying the Farmers

The individual farm operator is treated as the property tax paying unit. The income from the farming enterprise is not adjusted for payments (where applicable) to family labour.

Farm operators are firstly classified by income groups using both Income I and Income II, which are defined above. Secondly, farm operators are classified by product type of farm enterprise. The product type classification is based on percentage of agricultural production. There are four product types of farm enterprise. The basis of classification somewhat parallels the classification based on percentages used by the Agricultural Statistics Division, Statistics Canada [Statistics Canada, 1971 Census of Canada, Agriculture: Alberta, May, 1973].[1] They are: Grain Farm, Livestock, Livestock Products, and Mixed Farm (which are defined below). The Livestock and Livestock Products farm types are mainly ranching and dairy, respectively. A further classification is based on age. Seven age groups are used. The fourth classification is based on the location of the farm enterprise. The Edmonton-Calgary Corridor formed the dividing line. Farmers are either in Rural I or Rural II, as defined below.

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[1] See classification of farm types in Appendix I.

The Edmonton-Calgary Corridor is also used in classifying municipalities in the assessment study and school expenditure study. It is also used as a dummy variable in investigating factors affecting farm real estate prices.

Limitations of the Study and Adjustments in Data

The FBA program was initiated as a result of requests made by some farmers to the Alberta Department of Agriculture.[1] The farmers wanted to find how their management ability compares to each others, and also to improve their farm recordkeeping. Farmers are not selected by any particular sample procedure. They make the decision to participate in the program. Those farmers participating in the FBA program are believed to be more progressive than the average farmer in Alberta.

The number of farmers used in the analyses in this study are taken from the farmers who participated in the FBA program in 1970. As indicated in Table 3.1, the farmers used in the study have larger farm businesses than the average farmer in Alberta. At best, the sample may be said to be representative of large scale farmers. In view of this, no attempt is made to generalize the interpretation of the results to cover small farmers or farm operators who qualify as farmers by the census difinition of a farmer,

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[1] Farm management statistics are developed for the individual farmers. Farmers can compare their values to the average farm management statistics for the participating farmers.

TABLE 3.1

AVERAGE FARM AREA AND FARM CAPITAL FOR ALBERTA FARMERS AND SAMPLE FARMERS USED IN THE STUDY FOR SELECTED YEARS

Average Values for Alberta Farmers	1966	1971
Farm area (acres)	706	790
Farm capital (dollars)	60,734	83,603
Average Values for Farmers in Study	**1970***	
Farm area (acres)	1064	
Farm capital (dollars)	145,803	

Sources: [Alberta Department of Agriculture, A Historical Series of Agricultural Statistics, Alberta (Supplement), 1974].

*Calculated from 1970 FBA data, Farm Management Branch, Alberta Department of Agriculture.

but who may derive a major part of their income from off-farm sources.

The number of the FBA records available are few. There were 150 farm operators with FBA records for 1970 in the study area. Eighty of the 150 farm operators agreed to use of their FBA records in this study. The need to obtain extra information from the eighty farm operators and their municipal offices resulted in the loss of twelve farm operators. Either they did not supply the necessary information or the municipal offices involved could not supply some relevant information. Five farms which were either operated on partnership or corporation basis were eliminated.

It has been observed that off-farm earnings were about one-third of the total income of Prairie farm families in 1958 [Lerohl, 1973, p. 6]. Off-farm income for Alberta farm families averaged 45 percent of their average income in 1971 [Lerohl, 1973, p. 6]. The increase in off-farm income as a percent of total income of Alberta farm families illustrates the growing importance of off-farm income in the overall economic position of the farmer. However, relevant data required to estimate off-farm income for the farmers in the study were incomplete. As a result, off-farm income is not considered. The results in Table 3.2 suggest that farm family off-farm income is higher and more important for farm families who have lower gross farm sales. This relationship suggests that if off-farm incomes are to be added to incomes of farmers in different income groups, the property tax burden will be more progressive or less regressive.

TABLE 3.2

DISTRIBUTION OF PRAIRIE FARM FAMILIES BY GROSS FARM SALES AND AMOUNT OF OFF-FARM INCOME, 1971

		Percent Distribution of Farm Families by Size of Off-Farm Income				
Gross Farm Sales	Total Farms	$0	$1-999	$1000-4999	$5000 and Over	Total
($)				Percent		
Less than 2500	20	10	18	40	33	100
2500 - 4999	19	5	30	44	21	100
5000 - 9999	26	6	37	44	14	100
10,000 - 24,999	28	4	45	39	13	100
25,000 and Over	8	2	44	33	21	100
Total	100	6	34	41	19	100

Source: [Lerohl, 1973, p. 7].

Information on property tax paid on rented land by farm operators (where applicable) could not be obtained. Knowledge of extent of property tax shifting to the renter in Alberta is also lacking. It was therefore not possible to allocate taxes paid on rented land to farm operators who rented land. Thus the study might be limited to direct property tax paid by the farm operator. If rented land did not form a major part of cultivated land (which seemed to be the case),[1] the limitation imposed by the inability to account for the location of the property tax on rented land will be minimal.

Data required to estimate the benefits derived from the overall property tax revenue and its distribution among taxpayers could not be obtained. As a result, the gross benefit and net incidence parts of the study are limited to the school property tax. A limitation which cannot be ignored here is that the external benefits of education are not considered.

Originally this study intended to investigate the ratio of market value of farm real estate to value of farm land for the income groups, the type of farm enterprise, etc. This phase of the study had to be abandoned because of lack of data. Information obtained from the municipal offices indicated that most municipalities have no knowledge of ratio of market values of property to assessed value of farm land. Information on assessed acreage of the farm of farm operators was not available. However, since farm operators may rent farm land, the total farm acreage may not necessarily be the same as the assessed acreage of the individual farm operator.

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[1] Rented land formed about 25 to 30 percent of total farm acreage in the study.

However, an attempt was made to estimate the assessed acreage for the individual farm operators.[1] In some cases, the estimated assessed acreage agreed with the actual assessed acreage (where it was available) and in other cases, the two values did not agree. As a result of the inconsistencies of the two values, the attempt to estimate the assessed acreage was abandoned.

In the investigation of the ratio of market value of farm real estate to the assessed value of rural real estate, it was not possible to separate the value of assessed land into farmland and non-farmland. It was again not possible to separate assessed value of buildings and improvements into farm buildings and improvements and non-farm buildings and improvements. The data on assessed valuation of property by municipalities supplied by the Department of Municipal Affairs are grouped under the heading Land, Buildings and Improvements, etc. The municipal offices were contacted for a breakdown of the assessed value of land into farmland and non-farmland and buildings and improvements into farm

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[1] In addition to Total Farm Acreage, dollar values of owner's land and landlord's land (where applicable) were available. For example, if Total Farm Acreage is 1000 acres, value of operator's own land is $80,000 and the value of landlord's land is $20,000. The estimated assessed acreage for the farm operator is calculated as

$$\frac{\$80,000}{\$100,000} \times 1,000 = 800 \text{ acres.}$$

and non-farm buildings and improvements. The municipal offices could not give the data requested. However, the results will at least give a general picture of the ratio of market value to assessed value of farmland for the municipalities.

The value of agricultural products sold per acre could only be calculated for Census Divisions. To obtain this value for municipalities, all municipalities in one Census Division were assigned that Census Division's value for agricultural products sold per acre.

A major assumption in the study is that the individual farm operator cannot shift part of the property tax levied on his land to consumers of his products. Some empirical studies quoted in Chapter II support this assumption. Definitions of terms are in Appendix I.

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CHAPTER IV

THE RELATIONSHIP BETWEEN PROPERTY TAX AND AGRICULTURAL REAL ESTATE PRICES

The provincial government has recently relieved residential property owners of the provincial mill rate for education (that is, the Foundation Fund Program mill rate). What would happen to the distribution of the tax burden for farm operators if the province reduced the mill rate for education on all taxable assets? The answer to this question can be obtained by investigating the relationship between property tax and agricultural real estate prices--a task attempted in this section.

The Model

The market price of agricultural real estate per acre is regressed on the tax rate and other variables. The data are drawn from the thirty-one municipalities within the defined study area. Average price of agricultural real estate per acre is the dependent variable. In addition to the tax rate, the four other independent variables are related to agricultural productivity, availability of farm real estate credit, and urban factors.

The tax rate used is the actual tax rate (average mill rate) for the municipality.[1] The average actual property tax rate for the thirty-one municipalities was $68.37 per $1000 of assessed value, ranging from $55.20 to $82.90. The actual tax rate is hypothesized to have a negative influence on real estate values, since the return to land will decline with imposition of the tax. Value of farm production per acre is used as the productivity variable.[1] The value of the coefficient for farm production per acre is hypothesized to have a positive sign.

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[1] Mill rate is tax dollars per $1000 of assessed value.

The availability of agricultural real estate credit and its cost, represented by the annual net addition of outstanding farm credit is expected to have a positive impact on the price of agricultural real estate. For purposes of this analysis, the net addition of outstanding Farm Credit Coroporation loans in each municipality in 1970 is used to represent this variable. FCC credit accounts for most of the credit outstanding and reflects Government assistance in the cost of credit.[2]

Two variables were used to represent urban influence. One is percentage change in population from 1961 to 1971. Out of the thirty-one municipalities, twenty-seven had a negative change in population ranging from -0.75 percent to -27.0 percent. The average population change for the municipalities was -10.2 percent. A negative population change may result in less pressure on land, but other forces such as non-farm purchases of land may result in rising land prices. In view of the latter forces, it is hypothesized that depopulation will result in increasing agricultural real estate prices.

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[1] Value of farm production per acre was calculated for farms with sales of $2,500 or greater on municipality basis.

[2] The FCC loans were mostly long-term loans. Ideally, all loans for farm purchases should have been used as the variable. However, information gleaned from published statistics and other sources indicate that long-term loans to the farm sector are mostly given by the FCC. The table below indicates that outstanding FCC long-term loans were approximately 60 percent of the long-term loans from all sources combined in each year. The constant share of FCC long-term credit in overall long-term farm credit indicates that if

The other urban variation is a dummy variable. The dummy variable represents municipalities off the Edmonton-Calgary Corridor (Rural II). By applying this distinction, it is assumed that agricultural real estate prices in municipal districts in Rural II are subject to less urban influence. The dummy variable is hypothesized to have a depressing influence on price of land.

With the exception of value of farm production, all the economic variables are based on 1971 data. The value of farm production is for 1970.

Mathematical representation of the model is:

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long-term credit from other sources are combined, the FCC loans fit the trend of changes in all loans for long-term purposes.

Estimated Farm Long-Term (More Than 10 Years)
Credit Outstanding, Canada, 1967-1970

Source	1967	1968	1969	1970
	(Millions of dollars)			
Farm Credit Corporation	915.8	1036.1	1111.5	1154.1
Veteran's Land Act	172.3	180.4	167.5	155.9
Provincial Government Agencies	332.3	351.7	372.1	398.1
Private Individuals	65.0	67.0	70.0	75.0
Insurance, Trust and Loan Companies	56.0	60.0	58.0	54.0
Treasury Branches (Alberta)	1.5	1.4	1.0	1.9
Alberta Electrical Cooperatives	17.2	16.8	16.1	15.3
Total Long Term	1,560.1	1,713.4	1,796.2	1,854.3
Percent of FCC credit to total	59	60	62	62

Source: [Rust, December, 1972, p. 3].

$$Y = f\ (X_1, X_2, X_3, X_4, X_5)$$

where Y = Average price of Agricultural Real Estate per acre by municipality in 1971;

X_1 = Actual property tax rate per $1000 assessed value by municipality, 1971;

X_2 = Value of agricultural production per acre in dollars by municipality, 1970;

X_3 = Net additions of outstanding FCC loans in dollars, 1970-1971 financial year;

X_4 = Dummy variable for municipalities off the Edmonton-Calgary Corridor; and

X_5 = Percentage change in population from 1961 to 1971 by municipality.

All the variables are in linear form and ordinary least square regression (OLS) is used in the regression analysis.

Discussion of Results

The equation below is obtained by the OLS analysis of cross-section data.

$$Y = 70.39 - 0.47X_1 + 1.61X_2 + 2.73 \times 10^{-5}X_3 - 23.78X_4 - 0.50X_5$$

S.E.	(0.29)	(0.87)	1.04×10^{-5}	8.20	0.23
T. Statistic	(-1.62)	(1.84)	(2.63)	(-2.90)	(-2.23)
Means	68.37	17.45	243797.00		-10.22

Mean of Y = 63.07

$R^2 = 0.74$

At 0.10 significance level, all the variables are significant. Variables X_3, X_4 and X_5 are significant at 0.05 significance level. The coefficients of all the variables have small standard errors. Except for variable X_5, all variables have the expected sign. The results suggest that the variables explain about 75 percent of the variation in the per acre value of agricultural real estate between rural municipalities in Alberta.

The decrease in population of rural Alberta agreed with popular opinion. What the negative sign of the regression coefficient of the change in population variable means is that a decrease in population results in an increase in per acre value of agricultural real estate in the rural areas. Among offsetting forces which may account for the rising land prices are purchases of land to achieve economics of scale and protect a competitive position; non-farm purchases of land; and purchase of land as an inflationary hedge. Table 4.1 indicates that while area farmed remained about the same during the five-year period, the number of farms declined in Alberta. It is believed that change in farm size in the study area may follow the provincial trend. These two developments explain the increase in average area farmed. The relationship between number of farms, area farmed and average area per farm for 1966 and 1971 suggests expansion purchases of farmland. It may be that quantity of land made available by farmers leaving rural areas is less than the land demanded by farmers who want to expand their farm area.

The dummy variable, X_4, is intended to account for

TABLE 4.1

NUMBER OF FARMS AND AREAS IN ALBERTA FOR SELECTED YEARS

	1966	1971
Number of farms	69,411	62,702
Non-resident farms	7,414	4,617
Total farms	76,825	70,319
Area in farms ('000 acres)	48,983	49,506
Average area per farm (acres)	706	790

Source: [Alberta Agriculture, A Historical Series of Agricultural Statistics, 1974].

expected differences in agricultural real estate values between municipalities in Rural I and Rural II. The dummy variable had the expected sign and the variable being significant indicates that there is a variation in average agricultural real estate prices per acre for Rural I and Rural II. When the other variables affecting agricultural real estate are held constant, the regression coefficient indicates that average agricultural real estate prices per acre in Rural II are $23.8 lower than in Rural I.

The productivity variable--value of farm production per acre, X_2--has the expected positive sign. The coefficient for value of the agricultural production variable indicates that an increase of $5.00 in the value of agricultural production per acre will result in an increase of $8.00 per acre in the price of agricultural real estate.

The availability of agricultural real estate credit, represented by net additions of outstanding FCC loans, X_3, has the hypothesized sign. It is understandable that the coefficient of regression of this variable is small. It would require a large amount of money introduced into a municipality for purchases of agricultural real estate to create a significant effect on the average value of agricultural real estate in a municipality. The average net addition of outstanding FCC loans (X_3) is $243,797. The regression coefficient of X_3 indicates that an increase of $100,000 net outstanding FCC loan (with other long-term credit increasing in proportion) will increase price of agricultural real estate by $2.7.

The implication here is that farm operators do benefit from the government subsidized agricultural real estate credit, capitalizing the benefits into high real estate values.[1] The easy availability and better terms of the FCC loans to purchase land would likely lead to higher prices of agricultural real estate.

The tax rate variable, X_1, has the expected sign. The regression coefficient of the tax variable suggests that a ten percent increase in the actual property tax rate would cause a reduction of $4.65 per acre in the average price of agricultural real estate. The results imply that actual property tax rates are capitalized into lower agricultural real estate prices. The extent of capitalization would depend on the market interest rate used for discounting and the rate of appreciation of agricultural real estate values.

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[1] The cost of this credit is subsidized. Farmers pay an interest rate which is less than the market interest rate. Reynolds and Timmons also observed that farmers in the U.S. capitalize benefits from government programs into high real estate values [Reynolds and Timmons, 1966, pp. 342-350].

Determination of Extent of Capitalization of Rural Property Tax Rates in Alberta

Agricultural real estate values for Alberta in 1950 and 1971 were \$33.00 per acre and \$58.53 per acre, respectively.[1] The increase in agricultural real estate value per acre over the twenty-one-year period (1950 to 1971) works out to an annual compounded rate of appreciation of three percent. The market interest rate was 5.75 percent in 1971 [Bank of Canada Review, Nov. 1973]. The property tax rate was 68.4 mills in 1971.[2]

Considering the market interest rate, the annual compounded rate of appreciation of agricultural real estate values and the property tax rate, the annual return to land to give the market price of land is calculated as follows:

$$Y = \frac{R}{t + r - A} \qquad (1)$$

where Y = Market price of agricultural real estate in 1971 = \$58.53;

R = Annual return to land in 1971;

t = Tax rate in 1971 = 68.4 mills;

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[1] The 1971 value is the mean value for the municipalities used in cross-section OLS analysis.

[2] The tax rate is the average value for the municipalities used in the cross-section OLS analysis.

r = Market interest rate used as the discount rate = 5.75 percent; and

A = Annual rate of appreciation = 3.0 percent.

Substituting the values in Equation 1:

$$58.53 = \frac{R}{t + r - A} = \frac{R}{0.096} \qquad (1)$$

$$R = 58.53(0.096)$$

$$= \$5.56$$

Assuming the tax rate is increased by 10 percent, the market price of land, Y, is calculated as follows:

$$Y = \frac{R}{(r-A)+t_1} \qquad (2)$$

where t_1 = New tax rate = 7.5 percent (t increased by 10 percent, 6.84 + 0.684 = 7.5 percent),

$$Y = \frac{\$\ 5.56}{0.027 + 0.075}$$

$$= \$54.6.$$

Thus, a 10 percent increase in the tax rate reduces the value of agricultural real estate \$54.61 per acre. Full capitalization implies a reduction of the price of agricultural real estate per acre of \$3.92 (that is, \$58.53 - \$54.61).

In the empirical study, a 10 percent increase in the tax rate causes a reduction of \$4.65 per acre in the average price of agricultural real estate. The results of the analysis suggest that rural property tax rates in Alberta are greatly capitalized.

The following are also inferred from the formulas and results:

1. The formulae indicate that interest rate and property tax rate have similar effect;

2. A 10 percent increase in mill rate will require nearly twice as much relative increase in net revenue per acre to compensate for the increase in mill rate if a decline of land prices is to be prevented; and

3. As revenues increase in agriculture, the mill rate can be used to compensate the inflationary effect on agricultural real estate prices. This observation may be further investigated to find its effectiveness as a policy tool and also the impact of such a tool on agricultural industry. The measure may be beneficial to beginning farmers when land prices are low. However, it may not be beneficial to the agricultural industry.

A reduction in the tax will benefit farmers when there is a cost-price squeeze on revenue per acre. The benefit from the tax reduction will depend on the extent to which property taxes are capitalized and will also be relatively higher for farmers with a larger value of agricultural real estate.

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CHAPTER V

INCIDENCE OF PROPERTY TAX PAID

Measuring the incidence of any cost among farmers makes the concept of income a crucial issue. In this chapter, the hypothesis is tested that the character of the property tax incidence is not markedly regressive when an annual lifetime income is used. The two concepts of income introduced previously, Income I and Income II, are compared in the analysis.

The main part of the analysis is the measurement of the incidence of property tax paid. The property tax incidence is measured through expression of the property tax payment as a percent of income--firstly on Income I and then on Income II. The property tax burden is investigated with reference to four groups. The first is based on the classification of the farm operators by income groups. Secondly, the farm operators are classified on the basis of farm type. Four farm types are developed.[1] Thirdly, the classification of the farmers is based on age of the farmer. There are seven age classes. In the final group, location of the farm formed another basis for classifying the farmers. There are two locational classes: (a) Rural I, representing farms located in municipalities within the Edmonton-Calgary Corridor and (b) Rural II, representing municipalities outside the Edmonton-Calgary

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[1] Supra, pp. 46-47.

Corridor.

Incomes and Average Tax Incidence for Selected Farm Operators

The averages of Income I and Income II for all sample farm operators are $5845 and $19,282 respectively.[1] The larger value of Income II suggests that the use of current income understates the real economic power of farmers. The large difference in the economic position of farmers represented by the choice of income concept is partially due to the nature of the class of farm operators used in the study. The selected farm operators are predominantly large scale farmers. The average value of total net worth of all the farm operators was $159,698, compared to $83,603, the average for the Province in 1971.[2]

The average property tax payment expressed as a percentage of average of Income I and average of Income II, for all the selected farm operators are 11.7 percent and 3.6 percent, respectively. If we are to agree with Allen, the measure of the property tax burden should be based on current income.[3] But, as argued elsewhere, the ownership of assets gives extra economic power to the owner of the assets.

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[1] Carlin also obtained an increase in the income measure of economic position of farmers [Carlin, 1973, pp. 63-64].

[2] The $83,603 value taken from the Historical Series of Agricultural Statistics excludes farm house and other personal assets which are ten percent of the average value of total net worth of the selected farmers [Alberta Agriculture, 1974].

[3] Allen states that "farmers happen to have more property but not income [Allen, 1968, p. 16].

Distribution of Farmers by Income Levels

The distribution of the farm operators by income levels on the basis of Income I and Income II are indicated in Table 5.1. Based on Income I, 69.9 percent of the farm operators had incomes of less than $9,000, 20.7 percent had incomes of between $9,000 and less than $18,000, and only 9.6 percent had incomes greater than $18,000. Based on Income II, 25.4 percent of the farm operators had Income II of less than $9,000, 25.4 percent had Income II of between $9,000 and less than $18,000 and 49.2 percent of the farm operators had Income II of more than $18,000. The results in Table 5.1 clearly illustrate that the Income II concept (annual lifetime income) changes the distribution of farm operators among the income classes, putting more farm operators in higher income levels.

TABLE 5.1

DISTRIBUTION OF FARMERS BASED ON INCOME I AND INCOME II BY INCOME LEVELS

Income Levels	Number of Farmers	Income I	Number of Farmers	Income II
		(%)		(%)
Less than $2,999	25	29.7	3	4.8
3,000 - 5,999	11	17.5	6	9.5
6,000 - 8,999	8	12.7	7	11.1
9,000 - 11,999	8	12.7	2	3.2
12,000 - 14,999	3	4.8	9	14.3
15,000 - 17,999	2	3.2	5	7.9
18,000 - 20,999	1	1.6	6	9.5
21,000 - 23,999	0	0	11	17.5
24,000 and over	5	7.9	14	22.2
Total	63	100.0	63	100.0

Source: Calculated from the 1970 FBA data obtained from Farm Management Branch, Alberta Department of Agriculture.

(However, it should be noted that Income II is not realized income.)

Incidence of the Property Tax by Income Levels

The results of the incidence of property taxation for different income levels as measured by mean property tax as percent of mean income (Incomes I and II) are found in Table 5.2. Nine income levels are used in the analysis. In the case of the analysis based on Income I, income levels between the $12,000 and $23,999 income range are pooled due to insufficient observations in each level.

The negative mean income values in the first income level in Table 5.2 make the percentage measure of the tax incidence inapplicable. However, because the mean incomes are negative at the first income level, the property tax incidence for operators in this level is more burdensome than for any other income level.

The results in Table 5.2 suggest that, for farmers in the study, when Income I is used in the analysis of the property tax incidence, the property tax is regressive from the first income level to the $9,000 to $11,999 income level. The pooling of income levels in the $12,000 to $23,999 income range to one income level makes it difficult to compare the property tax incidence of adjacent income levels.

The relatively high proportion of farmers in the lowest income level is attributed to the fact that the opportunity cost of operators net worth has been subtracted

TABLE 5.2

INCIDENCE OF THE PROPERTY TAX PAYMENT BY INCOME LEVELS BASED ON INCOME I AND INCOME II[1]

Income Levels	Number of Farmers	Mean Income	Mean Property Tax Paid	Incidence of Property Tax Paid
		($)	($)	(%)
Income I				
Less than $3,000	25	-3,664	824	*[2]
3,000 - 5,999	11	4,183	517	12.4
6,000 - 8,999	8	7,694	586	7.6
9,000 - 11,999	8	10,259	456	4.4
12,000 - 23,999	6	15,989	488	3.1[3]
24,000 and over	5	34,857	1,110	3.2
All farm operators	63	5,845	685	11.7
Income II				
Less than $3,000	3	-26	712	*[2]
3,000 - 5,999	6	4,204	522	12.4
6,000 - 8,999	7	7,396	601	8.1
9,000 - 11,999	2	9,316	911	9.8
12,000 - 14,999	9	14,024	439	3.1
15,000 - 17,999	5	16,712	525	3.1
18,000 - 20,999	6	19,447	667	3.4
21,000 - 23,999	11	22,282	758	3.4
24,000 and over	14	29,118	924	2.4
All farm operators	63	19,282	685	3.6

[1] Income I and Income II are defined in Appendix I.

[2] The negative value obtained cannot be interpreted in the same manner as the other income levels. It simply means the tax burden is relatively higher than the next income level.

[3] Income levels between the $12,000 and $23,999 income range are pooled due to insufficient observations in each level.

Source: Calculated from the 1970 FBA data supplied by the Farm Management Branch, Alberta Department of Agriculture, Edmonton, and tax records for the individuals supplied by municipal officials.

from their net farm incomes to give Income I. The large mean property tax paid by farmers in the lowest income level is explained by the presence of a high proportion of farmers who operate extensive type farms. Likewise, the relatively little mean property tax paid by farmers with mean income of $15,989 is explained by the presence of a high proportion of farmers who operate intensive type farms. The relationship of the property tax paid and farm type is investigated at the section on tax incidence by farm type. The fact that there are only two farmers in the $9,000 to $11,999 income level under Income II in Table 5.2 limits the interpretation of the 9.8 percent as progressive. Up to the $6,000 to $8,999 income level, the incidence of the property tax is regressive. For the selected farmers whose average incomes (Income II) fall within income levels between the $12,000 and $23,999 income range, the incidence of the property tax is approximately proportional as indicated under Income II in Table 5.2.[1]

The results of the $12,000 to $23,999 income range in Table 5.2 (Income II) agree with the initial hypothesis that the incidence of property tax is proportional if the income concept used in measuring the incidence takes account of the net worth of the farm operator. The last income level in Table 5.2 (under Income II) indicates that the incidence of property tax at this level is regressive. But even at this income level, the magnitude of the tax burden does not differ greatly from the incidence of the four income levels where the tax incidence is proportional for all practical purposes.

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[1] See Appendix I for definitions of regressive, proportional and progressive tax.

The increase in mean property tax payment as mean income increased from the second to the fourth income level and from the fifth to the last income level may be explained by the relation of mean tax assessment and the income levels (refer to Appendix III). The mean tax assessment increased with increases in income up to the fourth income level. The mean tax assessment decreased from the fourth income level to the fifth income level and then increased again to the ninth income level. The same pattern exists in Table 5.2, but not so markedly. What the above relation might indicate is that the measure of the incidence of the property tax should be related to Income II.

The results of this part of the study imply that the conclusions as to the property tax depend on the economic measure or income concept used in the measurement of the tax incidence.

Using the same data, a firmer conclusion is made that for farmers in the study, the property tax becomes more proportional at higher income levels when Income II is used than when Income I is used. The extent of regressivity at the lower income levels will definitely be reduced if other sources of income are accounted for in the computation of Income I and Income II since it has been observed in Table 3.2 (see page 49) that low income farmers receive a relatively high off-farm income as compared to farmers in higher income groups. It has also been observed that the contribution to a farm family's income by spouse and children is relatively higher for low-income farm families [Lerohl, 1973, pp. 7-8].

The approach of using a combination of Income I and a flow from the farmers' assets is appropriate in view of the reasons adduced earlier. Appendix IV indicates that using different interest rates gives similar conclusions--that on the basis of Income II, the incidence of property tax by income levels is proportional at higher income levels. Therefore, the use of a slightly different annuity rate will not change the conclusions reached in the study.

Incidence of the Property Tax by Farm Type

It has been argued that a grain producer who has a larger investment in land assessed for tax purposes ends up paying a greater portion of his income in property taxes. However, there is little empirical evidence to support this type of inequity of the property tax in Alberta.[1]

The 1970 FBA data are used in the analysis. Four farm types are developed; the criteria for developing them are as described earlier.[2] The four farm types are grain, livestock (mainly cattle), livestock products (mainly dairy) and mixed farms (farms which do not qualify for any of the other farm types). The average property tax paid by farmers within each farm type is expressed as a percentage of their income. The calculations are based firstly on Income I and secondly on Income II.[1]

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[1] Theoretical calculations in a study by Allen suggest that the property tax is not neutral between farmers operating different farm enterprises [Allen, 1968, pp. 20-21].

[2] Supra, pp. 46-47.

The results are as expected. The grain farmer bears the greatest tax burden regardless of whether the measure of the property tax incidence is based on Income I or Income II (shown in Table 5.3). The mixed farm operator bears a greater tax incidence than the livestock and livestock product operators. The least tax incidence is borne by the livestock products operator. Inspection of Table 5.3 indicates that there are greater decreases in the property tax incidence for grain farmers and mixed farm operators when the income measure of the tax incidence is changed to Income II. Livestock product operators had the least change, the tax incidence decreasing from 4.9 percent to 2.2 percent.

Results in Table 5.4partly explain why grain farm operators bear a greater tax incidence than operators of other farm types. Inspection of the table indicates that tax assessment is greatest for grain farmers (and they have a relatively lower mean income regardless of whether income is based on Income I or Income II). The higher assessed value per acre for the grain farm operator as compared with the value for the livestock farm operator is partly attributed to grain farm operators having a higher percentage of im-

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[1] Income I and Income II are as defined earlier.

TABLE 5.3

INCIDENCE OF PROPERTY TAX PAYMENT BY FARM TYPE BASED ON INCOME I AND INCOME II[1]

Farm Type	Number of Farmers	Mean Income	Mean Property Tax Paid	Incidence of Property Tax Paid
		($)	($)	(%)
Income I				
Grain	8	-2537	1178	*[2]
Livestock	17	5741	863	15.0
Livestock Products	31	9242	456	4.9
Mixed Farm	7	634	704	111.1
Income II				
Grain	8	14,249	1178	8.3
Livestock	17	23,085	863	3.7
Livestock Products	31	20,386	456	2.2
Mixed Farm	7	10,908	704	6.5

[1] Income I and Income II are defined in Appendix I.

[2] The negative value cannot be interpreted in the same manner as the values for the tax burden measure for the other farm types. It simply means that the tax burden for the grain farmer is relatively greater than the tax burden for operators of the other farm types.

Source: See Table 5.2 on page 69.

proved land. Livestock operators, however, benefit from a lower average assessment ratio of 0.152 compared to 0.179 for grain producers.

Income II, the annual lifetime income, is unable to account for variation of tax incidence between operators of different farm types. The disparity of the tax incidence among farm types in the study may be reduced by either widening the tax base or improving the productivity of the resources used by grain farmers and mixed farm farmers. The latter suggestion is not intended to be a policy suggestion since there may be other factors contributing to the variation of the tax incidence of operators of different farm types. It cannot be ruled out that livestock product operators have superior management ability and utilize resources better.[1]

TABLE 5.4

MEAN FARM ACREAGE, FARM OPERATORS' MEAN TOTAL NET WORTH, MEAN LAND VALUE, AND MEAN TAX ASSESSMENT, BY FARM TYPE

Farm Type	Average Farm Size	Total Net Worth	Land Value	Tax Assessment
	(A)	($)	(A)	($)
Grain	1678	204,244	103,248	18,460
Livestock	1654	196,911	87,180	13,207
Livestock Products	543	135,533	55,039	6,994
Mixed Farm	1232	125,545	79,230	11,969

Source: See Table 5.2 on page 69.

The finding that a reduction in the property tax rate is capitalized into higher agricultural real estate prices may affect the redistribution of the tax burden by farm types. It has been stated elsewhere that the benefit of a reduction in the property tax rate increases as the ownership of taxable property increases.[2] The grain farmer (with the greatest taxable property) will thus receive the greatest benefit from a property tax reduction. The economic base of the grain farmer would also be improved because of the procedure used in deriving Income II, the annual lifetime income. The extent of reducing the variation of the tax incidence by a reduction in the property tax rate would depend on the original disparity of the tax incidence by farm type and the magnitude of the property tax rate reduction.

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[1] Pearson observed that a desire to bring about equity may lead to inefficient use resources; this cannot be ignored here [Pearson, 1971, pp. 73-75].

[2] Supra, p. 63.

The contribution of off-farm income to income of farmers may be relatively greater for grain farmers [Lerohl, 1973, p. 11]. Should this be the case, the grain farmers' tax incidence will decline.

Incidence of the Property Tax by Age Groups

It has been mentioned that the older farmers bear a greater property tax burden than do younger farmers. This opinion has led to a call for the reduction of the property tax bill for older people. This belief is predicated on the impression that older farmers' incomes are relatively fixed. It becomes questionable if total wealth is incorporated in the economic base of the aged. Acquisition of wealth increases with age. The belief becomes more questionable when the old people are farm operators. The old farm operator may have little income but may be rich in assets--as the saying goes: "Farmers live poor and die rich." Farm operators were divided into seven age groups. The tax incidence was measured for each group and was first based on Income I (the current income), then on Income II (the annual lifetime income).[1]

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[1] Income I and Income II are defined in Appendix I.

The results of the tax incidence measure based on Income I (Table 5.5) somewhat confirm the hypothesis that the property tax incidence increases with age. The incidence increases with age up to the fourth income level and then decreases. The least tax incidence is borne by farmers in the lowest age group (farm operators less than thirty-one years of age). The greatest tax incidence is borne by farmers between forty-one and fifty years of age. The oldest farmers bore the third highest tax incidence following farmers in age levels 4 (forty-one to forty-five years of age) and 5 (forty-six and fifty years of age).

Even though the tax incidence generally increases with age as is illustrated in Table 5.5, there is no such relationship between income and age. The mean of Income I for the age levels in Table 5.5 indicates that incomes for farmers in the lower age levels exceed incomes for farmers in the upper age levels. This observation may help explain the greater tax incidence borne by older farmers. On the basis of Income I, the variation in the tax incidence is very great. It ranges from 4.5 percent to 22.4 percent.

Comparison of mean incomes for the age levels for Income I and Income II in Table 5.5 indicates that consideration of the economic power of farmers through the introduction of Income II resolves the incidence inequity for farm operators in the higher age levels. The relationship between operator's net worth, land values, and age in Table 5.6 partly explains why the increase in economic power

TABLE 5.5

INCIDENCE OF PROPERTY TAX PAYMENT BY AGE GROUPS BASED ON INCOME I AND INCOME II

Age Groups	Number of Farmers	Mean Age	Mean Income	Mean Property Tax Paid	Incidence of Property Tax Paid
Years		Years	($)	($)	(%)
Income I					
Less than 31	5	28	14,374	647	4.5
31 - 35	11	33	4,659	390	8.4
36 - 40	11	38	8,634	852	9.8
41 - 45	16	43	3,382	757	22.7
46 - 50	10	48	4,198	873	20.8
51 - 55	6	52	6,695	653	9.8
56 and over	4	59	3,332	373	11.2
Income II					
Less than 31	5	28	25,239	647	2.6
31 - 35	11	33	13,940	390	2.8
36 - 40	11	38	21,249	852	3.8
41 - 45	16	43	15,759	757	4.8
46 - 50	10	48	18,796	873	4.6
51 - 55	6	52	25,937	653	2.5
56 and over	4	59	23,691	373	1.6

Source: Calculated from the 1970 FBA data supplied by the Farm Management Branch, Alberta Department of Agriculture, Edmonton, tax records for the individuals supplied by municipal offices and data supplied by the selected farmers.

was greater for operators in the higher age levels. Both operator's net worth and land value increased with age.[1]

The tax incidence measured on Income II also increased with age up to a limit, as shown in Table 5.5. The increase in the tax incidence with age, when Income II is used, was not as pronounced as when using Income I in the analysis.

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[1] Age levels 1 and 3 were exceptions which did not fit into the trend. Probably these two exceptions would be eliminated when using a larger number of farmers.

TABLE 5.6

OPERATOR'S NET WORTH AND LAND VALUE BY AGE LEVELS

Age Intervals	Number of Farmers	Operator's Net Worth	Land Value
Years		($)	($)
Less than 31	5	142,803	63,094
31 - 35	11	119,842	53,400
36 - 40	11	170,377	84,411
41 - 45	16	150,348	69,948
46 - 50	10	168,523	72,956
51 - 55	6	211,376	77,171
56 and over	4	198,880	118,425

Source: 1970 FBA data: Alberta Department of Agriculture.

The tax incidence even appeared to be roughly equal for the first two age levels and the middle three age levels. This finding for farmers in the study is contrary to an inference from the Brown Report that old people bear a relatively greater tax incidence [Brown Report, 1970, pp. 41-42]. The problem with this inference is that the tax incidence is measured on a particular economic base which is elsewhere argued to be of questionable validity.

It is observed that farmers in the highest age group have the least Income I but are among those with the highest economic power. This observation suggests a need to release the economic power locked up in asset holdings to the old farmers. How to achieve this is not, however, the task of this study.

Incidence of Property Tax by Location

Farmers in the neighborhood of urban centres have relatively smaller farm acreages [Alberta Department of Agriculture, 1971 Census of Agriculture by I.D., M.D., and County, March, 1973, pp. 1-7]. It is believed that population pressure and other economic factors, such as producing farm products (dairy products, eggs, etc.) which have good markets in the urban fringe areas, account for the relatively smaller farm sizes. The farm types operated by these farmers and the smaller size of farms have led to heavy investment in equipment, machinery and farm buildings and have also resulted in a greater percentage of improved farmland.

Other factors which affect the property tax incidence of taxpayers in different municipalities include ratios of assessed valuation per acre to market price of agricultural real estate per acre and the provincial SFP. A large variation of the ratio of assessed valuation of agricultural real estate per acre to market price of agricultural real estate per acre between municipalities will make the work of Equalization Board more difficult.[1] If the mill rate is equal, a relatively low ratio for a municipality means a relatively higher tax bill for taxpayers in that municipality.

The provincial SFP is intended to minimize the differences in school mill rates. The success of the SFP will have an impact on the school tax bill paid by farmers in different municipalities. Before treating the burden of property tax of farmers in different areas, some of the factors which potentially affect the tax burden for farmers in different localities are investigated.

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[1] The Alberta Equalization Board makes a series of adjustments to the assessment totals of each municipality to obtain equalized assessment of a municipality. Equalization results in an equal distribution of provincial requisitions as among municipalities and between urban and rural areas [Brown Report, 1970, pp. 22-23].

Assessed Valuation to Market Price of Agricultural Real Estate per Acre by Location--The capital intensive nature of farms and other urban factors, such as population pressure and demand for land for non-agricultural purposes, make the value of agricultural real estate in the rural-urban fringe relatively high. It is hypothesized that the ratio of assessed valuation per acre of market price of agricultural real estate per acre is higher for areas outside the rural-urban fringe.

The municipalities are divided into areas--Rural I and Rural II (defined earlier). The ratio of assessed valuation per acre to market price of agricultural real estate per acre is estimated for Rural I and Rural II.

The market price of agricultural real estate per acre includes both land and buildings. The assessed valuation per acre is only value of land and excludes farm buildings.[1] The discrepancy in the composition of the two real estate values (market price and assessed valuation) limits the reliability of the results.

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[1] Data on assessed valuation of land and farm buildings are not available for the municipalities. Some municipal offices informed the writer that between 80 and 90 percent of assessable land is agricultural land. The data used were collected by different agencies for the specific use of the agencies.

The results in Table 5.7 indicate that the hypothesis that the ratio of assessed valuation per acre to market price of agricultural real estate per acre is relatively higher for Rural I is questionable. Further, Table 5.7 suggests that land fragmentation actually increased assessment as percent of market value of property for municipalities where urban influence is greatest.[1] Contrary to general opinion, the ratios indicate that assessment is forty percent and thirty percent of market price of agricultural real estate per acre for Rural I and Rural II, respectively. The implications of the results are that, if the mill rate is identical, the tax bill for farmers in Rural I is relatively higher than for farmers with similar sized farms in Rural II.

The School Foundation Fund Program (SFP)--To investigate the effectiveness of the SFP, the municipalities are again grouped into Rural I and Rural II. Average total school mill rate, school property tax revenue per pupil and total school operational expenses are computed for each area. (Refer to Appendix I for definitions of terms underlined.)

Table 5.8 shows that the mill rates for school purposes are almost equal. The average school property tax revenue realized per pupil for Rural II is lower than for Rural I. The total school operational expenses per pupil are higher in Rural II than in Rural I.

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[1] Average farm sizes in Rural I and Rural II are 693 and 2,487 acres, respectively.

TABLE 5.7

RATIO OF ASSESSED VALUATION OF LAND PER ACRE TO MARKET PRICE OF AGRICULTURAL REAL ESTATE, BY LOCATION, 1970[1]

Location	Number of Municipalities	Mean Market Price of Agricultural Real Estate per Acre	Mean Assessed Valuation of Land per Acre	Ratio of Assessed Valuation to Market Price of Agricultural Real Estate per Acre
		($)	($)	
Rural I	12	74.2	50.1	0.4
Rural II	20	49.7	15.0	0.3

[1] Using assessed valuation of land and buildings (include commercial and residential) per acre, the ratios are 0.5 for Rural I and 0.3 for Rural II. This result suggests that if assessed valuation of agricultural real estate per acre could be obtained, the ratio will still be lower for Rural II.

Source: [Miller and Pattison, 1972, pp. 1-30; Alberta Department of Municipal Affairs, 1972, p. 281 and p. 313].

TABLE 5.8

AVERAGE TOTAL SCHOOL MILL RATE, SCHOOL PROPERTY TAX REVENUE PER PUPIL, AND TOTAL SCHOOL OPERATIONAL EXPENSES PER PUPIL, BY LOCATION, 1970

Location	Number of Municipalities	Average Total School Mill Rate	School Property Tax Revenue per Pupil	Total School Operational Expenses per Pupil
		(Mills)	($)	($)
Rural I	13	41.3	315	832
Rural II	20	40.8	293	853

Source: [Calculated from data obtained from Alberta Department of Municipal Affairs, 1972, p. 282 and p. 314; Alberta Department of Education, 1971].

The results in Table 5.8 suggest that the SFP minimizes differences in school property tax rates. Without SFP, the average municipality in Rural II would have to raise more revenue by way of school property tax to finance elementary and high school education. We now go on to investigate the tax incidence by location.

Farmland mainly forms the tax base of farmers in Alberta. Thus, if farmers in one area have relatively little farmland, then their tax base in this area will in general be smaller.[1]

The relationship of the tax incidence to farmers in different areas is investigated by grouping farmers under Rural I and Rural II (refer to page 46 for basis of grouping). The tax incidence is firstly measured on the basis of Income I and is secondly measured on the basis of Income II. Definitions of Income I and Income II remain as in Appendix I.

Results of the analysis based on Income I, Table 5.9, indicate that the tax incidence is greater for farm operators in Rural II. The mean property tax paid expressed as percent of mean income (Income I) are 15.5 percent and 10.4 percent for farmers in Rural I and Rural II, respectively.

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[1] A major reason for basing tax assessment on farmland is the fixity of land. Desirable qualities of using farmland as the tax base are: (1) municipalities may impose different rates of tax without causing shifts of resources from high to low tax rate areas, and (2) residents of a municipality cannot tax residents of another in order to finance more social goods for themselves [Report of the Ontario Committee on Taxation, 1967, p. 5].

Even though the average income (Income I) of farmers in Rural I, tax equity based on ability to pay cannot be said to be equitable. There is a difference of $1,901 between the average income of farmers in Rural I and Rural II. The average property tax paid by the average farmer in Rural I is half the tax paid by the average farmer in Rural II.

TABLE 5.9

INCIDENCE OF PROPERTY TAX PAYMENT BY LOCATION BASED ON INCOME I AND INCOME II

Location	Number of Farmers	Mean Income	Mean Property Tax Paid	Incidence of Property Tax Paid
		($)	($)	(%)
Income I				
Rural I	50	5,453	567	10.4
Rural II	13	7,353	1,137	15.5
Income II				
Rural I	50	18,191	567	3.1
Rural II	13	23,475	1,137	4.9

Source: See Table 5.2, page 69.

The relatively small difference in income and the relatively large difference in property tax paid by the average farmer in Rural I and Rural II explains the wide variation in the tax incidence by location. The results are in agreement with the hypothesis that the property tax incidence is relatively higher for farmers in Rural II than for farmers in Rural I.

Inspection of Table 5.10 indicates that the average farm size in acres for farmers in Rural II is about three and a half times the farm size of farmers in Rural I. Land values per acre and assessed valuation per acre are higher in Rural I. It should be noted that the farm acreages reported in the FBA data are not necessarily the acreages on which assessment is based.[1] Earlier analysis suggested that market price of agricultural real estate is greater in Rural I.[2] Under these circumstances, farmers in Rural I would pay a greater property tax than farmers in Rural II if the farm sizes in acres were equal in the two areas.

TABLE 5.10

MEAN ACREAGE, MEAN ASSESSED VALUATION, MEAN LAND VALUE AND OPERATOR'S NET WORTH BY LOCATION

Location	Number of Farmers	Mean Farm Acreage	Mean Assessed Valuation	Mean Land Value	Mean Operator's Net Worth
		(A.)	($)	($)	($)
Rural I	50	693	8,638	68,382	150,893
Rural II	13	2,487	18,529	88,442	193,567

Source: See Table 5.2, page 69.

The large difference in sizes of farms which form the tax base has led to farmers in Rural II paying twice the property tax paid by farmers in Rural I. Earlier results indicated that rural farm property in Rural I is assessed at a higher rate than farm property in Rural II.[1] The higher assessment rate and other factors such as large percentage of improved land and high-valued land characteristics of Rural I cannot narrow the average taxes paid by the selected farmers in the two areas. Table 5.9 also shows the results of the tax burden measured on Income II.

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[1] It is probable that percent of farmland rented will be greater in Rural II.

[2] Refer to page 81 for limitations of the method for estimating these ratios.

As expected, the tax incidence measured as mean property tax paid as percent of Income II declined for farmers in the two areas. The tax burden for farmers in Rural I is 3.1 percent and the tax burden for farmers in Rural II is 4.9 percent. There is a reduction in the variation of the tax burden for the two areas. The average farmer in Rural II still bears a greater tax burden.

As expected, the tax incidence measured as mean property tax paid as percent of mean of Income II declined for farmers in the two areas. There is a reduction in the variation of the tax incidence for the study farmers in the two areas, and this is explained by the fact that the benefit from asset holdings is relatively higher for farmers in Rural II than in Rural I. Income II, the annual lifetime income concept, is not able to make the property tax proportional for the study farmers in the two areas.

The results in this chapter suggest that the current income (Income I) used in tax incidence studies contributes to the description of property tax as an inequitable tax.

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[1] Supra, p. 82.

The next chapter deals with benefit from expenditure financed with property tax revenue.

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CHAPTER VI

INCIDENCE OF BENEFIT OF SCHOOL EXPENDITURE

A purpose of taxation is to raise revenue to provide public goods and services which the individual may not be able to provide on his own. Again, the provision of public goods and services is a way of achieving income redistribution. The objective here is to determine the distribution of benefits from elementary and high school education for the selection of farmers in this study.

The consideration of benefits from property tax is limited to school property tax. Relevant data enabling the distribution of benefits from other expenditures are not available. Both Income I and Income II are used.[1] The farmers' benefit is measured by income levels, age levels and location of the farm.

The analysis is based on two methods of calculating school expenditure and hence, benefits. In the first method, the revenue obtained from property tax for school purposes in a municipality is the sum of the revenue realized from mill rates levied for the SFP and SSR. It is assumed that the amount obtained is entirely used up in school expenses. A municipality's revenue obtained from property tax for school purposes is divided by the total number of pupils in elementary and high schools in the municipality to give school expenditure per pupil.

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[1] Income I is defined as net farm income minus opportunity cost of operator's net worth. Income II is the sum of operator's Income I and annuity of his asset holdings. See pp.44-45 for detailed derivation of Income I and Income II.

In the second method, school expenditure per pupil is obtained by dividing total school operational expenses for a municipality by the total number of pupils in both elementary and high schools.[1] The expenditure per pupil is treated as a benefit transferable to the parents. For simplicity of discussion, benefit calculated from school expenditure financed with revenue from school property tax is called Benefit I (BI) and benefit estimated from total school operational expenses is called Benefit II (BII). The total benefits (BI or BII) for a farmer are obtained by multiplying the number of his children in elementary and high schools by the expenditure per pupil for the municipality in which the farmer is located. The mean benefit for farmers in an income, age or rural group is the sum of the total benefits for each group of farmers divided by the number of farmers in that group.

A limitation with this method of estimating benefit from elementary and high school education is that external benefits are ignored. Expenditure per pupil is assumed to be similar for pupils in elementary and high schools.

In this chapter the investigation is in two parts: analysis of gross benefits and net benefits. Net benefits are considered on the reasoning that gross benefit alone does not reveal much about the redistribution of income through taxation.

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[1] The revenue for financing total school operational expenses includes the revenue obtained from the SFP, SSR and other sources. The provincial contribution to the SFP formed about 60 percent of the revenue for financing elementary and high school expenses by municipalities.

Incidence of Gross Benefit of School Expenditure

For comparison purposes the gross benefit for an income or age group is expressed as a percent of mean income. (Benefit I, Benefit II, Income I and Income II are used.) The gross benefit for farmers in either Rural I or Rural II is expressed in a similar manner.

Incidence of Gross Benefit of School Expenditure by Income Levels

Public expenditure on education is believed to benefit the low income level more than the high income level. Public expenditure on education, as observed by Gillespie, benefits the taxpayer in the low income group [Gillespie, 1964, pp. 142-143]. Gillespie's observation may be attributed to the use of current income in the measurement of gross benefit (incidence of government expenditure in the Gillespie study). It is hypothesized that distribution of gross benefits from school expenditure by income levels based on Income II and Benefit I will be relatively equal. Nine income levels are normally used. As before, however, income levels in the $12,000 to the $23,999 income range are pooled due to insufficient observations for each level.

The results of this section are in Table 6.1.

Column I in Table 6.1, based on Income I and Benefit I, suggests that incidence of gross Benefit I is progressive. Progressive here means a decrease in gross benefit as income increases. The results based on Income II and Benefit I (Column 3 in Table 6.1) do not clearly indicate that gross Benefit I is progressive. However, inspection of the values in Column 3 indicate that gross Benefit I (based on Income II) is least for farmers in the three highest income levels.

The finding that the incidence of gross Benefit I (based on Income I) is progressive is in agreement with results of other studies which used current income to measure gross benefit. The progressive character of gross Benefit I (based on Income I in Column I) is used as a defense against the regressive incidence of the property tax when current income is used to measure the tax incidence. It is argued that if low income farmers bear a relatively greater property tax incidence, they are compensated by receiving a relatively greater gross Benefit I (based on Income I). The results in Column 3 (Table 6.1) do not lead to the acceptance of the hypothesis that the incidence of gross Benefit I (based on Income II) is proportional.[1]

The results in Column 2 (based on Benefit II and Income I) and Column 4 (based on Benefit II and Income II) indicate that gross benefit values (BII) are higher for all income levels than the gross benefit (BI) values (Columns 1 and 3). Comparison of results in Columns 1 and 3 with those of Columns 2 and 4 suggests that the increase in gross benefit (BII) is relatively higher for farmers in the low income levels. This finding implies that the provincial government's contribution to the SFP results in redistribution of income since without it the extra property taxes the farmers would otherwise be required to pay would take a relatively greater portion of the income of low income farmers than high income farmers.

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[1] Proportional here means that gross benefit remains the same proportion of income as income increases.

TABLE 6.1

INCIDENCE OF GROSS BENEFIT OF SCHOOL EXPENDITURE BY INCOME LEVELS BASED ON INCOME I, INCOME II, BENEFIT I AND BENEFIT II[1]

Income Levels	Income I Gross Benefit I (1)	Income I Gross Benefit II (2)	Income II Gross Benefit I (3)	Income II Gross Benefit II (4)
	(%)	(%)	(%)	(%)
Less than $3,000	*[2]	*[2]	*[2]	*[2]
3,000 - 5,999	9.6	23.5	13.7	35.6
6,000 - 8,999	5.1	14.4	3.3	9.8
9,000 - 11,999	3.5	10.0	4.6	9.4
12,000 - 14,999	2.4[3]	5.1[3]	2.6	7.2
15,000 - 17,999			5.2	13.5
18,000 - 20,999			1.0	2.8
21,000 - 23,999			1.5	3.4
24,000 and over	1.1	2.4	1.0	2.4

[1] Gross Benefit, Benefit I, Benefit II, Income I and Income II are defined in Appendix I.

[2] Mean negative incomes are obtained for farmers in this income level. The gross benefit values obtained are not applicable. However, the gross benefit for farmers in this income level is relatively higher than for farmers in subsequent income levels.

[3] Income levels between the $12,000 and $23,999 income range are pooled due to insufficient observations for each level.

Sources: Values taken from Appendix VI.

Gross Benefit of School Expenditure by Age

It is assumed that the number of children per family in elementary and high schools will be relatively higher for farmers aged between thirty-six and fifty years, than for farmers in other age categories. On the basis of this assumption, it is hypothesized that gross benefit (either BI or BII) will be relatively higher for farmers between thirty-six and fifty years of age.

The usual seven age levels are used. The results are in Table 6.2. Columns 1 and 2 represent gross Benefits I and II based on Income I. The results of these two columns follow a similar trend with Gross Benefits I and II increasing as the farmers' ages increase and decrease above and below the fourth age level. Farmers between the ages of forty-one and fifty obtain the highest relative gross Benefit by either measure.

The only difference between gross Benefits I and II (based on Income I) is that the variation in gross Benefit II across age groups is larger than that for gross Benefit I, especially for farmers within the forty-one to forty-five year age level (Columns 1 and 2 in Table 6.2.). The provincial contribution towards elementary and high school expenditure gives a larger relative benefit to age groups with a relatively smaller average of Income I. Selected farmers falling in the forty-one to forty-five year age group have the second lowest average of Income I. (See Appendix VII for average income by age.)

TABLE 6.2

INCIDENCE OF GROSS BENEFIT OF SCHOOL EXPENDITURE BY AGE LEVELS BASED ON INCOME I, INCOME II, BENEFIT I AND BENEFIT II[1]

Age Levels	Income I Gross Benefit I (1)	Gross Benefit II (2)	Income II Gross Benefit I (3)	Gross Benefit II (4)
Years	(%)	(%)	(%)	(%)
Less than 31	*[2]	*[2]	*[2]	*[2]
31 - 35	6.4	16.1	2.2	5.4
36 - 40	7.2	18.0	2.8	7.0
41 - 45	13.2	36.3	2.8	7.8
46 - 50	10.4	28.0	2.3	6.2
51 - 55	4.9	12.3	1.3	3.2
56 and over	5.1	12.1	0.7	1.7

[1] Gross Benefit, Benefit I, Benefit II, Income I and Income II are defined in Appendix I.

[2] Farmers under thirty-one years of age have no children in either elementary or high schools and the method of computing the benefit gives the impression that these farmers receive no benefit from elementary and high school education.

Sources: Values taken from Appendix VII.

Another observation is that there is a marked change in the relative positions of some age groups with respect to property tax incidence (see Appendix V for incidence of the school property tax) and gross Benefits I and II based on Income I. Farmers fifty-six years and over, and between thirty-one and thirty-five years of age had the third and fourth highest property tax incidence, respectively. However, farmers in these two age groups had the fifth and sixth highest gross benefit (BI or BII). These observations suggest that farmers in these two age levels benefit less from the school property tax than farmers in the other age groups.[1]

Results of Columns 3 and 4 in Table 6.2 are based on Income II. Farmers in age groups between thirty-six and forty-five years of age had the highest gross Benefit I and gross Benefit II. Apart from farmers less than thirty-one years old, those over fifty-five years old receive the least benefit from the provincial contribution towards financing elementary and high school education. It cannot be concluded that farmers less than thirty-one years old receive "zero" gross benefit (BI and BII) since external benefits of education are not considered. The young farmer derives benefit from education through the assurance that when his child comes of school age, he will be educated. Education costs may also be regarded as a lifetime expenditure in which assigning benefits to specific years obscures some benefits.

Inspection of Column 4 (based on Income II and Benefit II) indicates that differences in gross benefit (BII) by age levels brought about by provincial contribution towards elementary and high school education are not as dramatic as in the case of gross Benefit (BII) based on Income I. The hypothesis that the benefit from school expenditure is relatively higher for farmers between ages thirty-six and fifty becomes more acceptable when Income I and Benefit II are used. Using Income II shifts incidence of gross benefits in favour of younger farmers. The age range of highest gross benefit moved from the forty-one to fifty years of age interval (when Income I is used) to the thirty-six to forty-five years of age interval (when Income II is used).

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[1] In the case of gross Benefit I (based on Income I), farmers between fifty-one and fifty-five years of age had a slightly lower gross Benefit I than the gross Benefit I for farmers fifty-six years of age and over.

Gross Benefit School Expenditure by Location

The tax incidence for farmers in Rural II has been found to be relatively higher than the tax incidence for farmers in Rural I. Do farmers located in Rural II receive a correspondingly higher gross benefit (BI and BII) from school expenditure? The investigation of the gross benefit by location of farmers is intended to answer this question. The results are in Table 6.3. They indicate that there are no differences in gross Benefit I and II (based on Income I) received by the selected farmers in Rural I and Rural II.

TABLE 6.3

INCIDENCE OF GROSS BENEFIT OF SCHOOL EXPENDITURE BY LOCATION BASED ON INCOME I, INCOME II, BENEFIT I, AND BENEFIT II[1]

Location	Income I Gross Benefit I (1)	Gross Benefit II (2)	Income II Gross Benefit I (3)	Gross Benefit II (4)
	(%)	(%)	(%)	(%)
Rural I	6.7	17.3	2.0	5.2
Rural II	6.5	17.0	2.0	5.3

[1] Gross Benefit, Benefit I, Benefit II, Income I, and Income II are defined in Appendix I.

Sources: Values taken from Appendix VIII.

Similar observations are made when gross Benefits I and II are based on Income II as indicated in Columns 3 and 4. These observations suggest that (1) mean benefit (BI and BII) is proportional to the incomes of the selected farmers in Rural I and Rural II; (2) the provincial government's contribution to financing elementary and high schools does not change the relativity of the economic situations of the selected farmers in Rural I and Rural II; and (3) the change from Income I to Income II does not change the relationship between the two incomes for farmers in the two areas. The results obtained in this section, especially in the case of the investigation of gross benefit by location, makes it imperative to investigate the net incidence of the tax since the character of the incidence of the tax is in most cases different from the incidence of the gross benefit.

Incidence of Net Benefit of School Expenditure

The method of developing the net benefit of school expenditure incorporates procedures used in the estimation of the tax incidence and the gross benefit. As a result, the findings of the investigation of the net benefit of school expenditure are less reliable. The net benefit for an income group, for example, is obtained by expressing the difference of mean benefit (either BI or BII whatever the case) and mean school tax paid by the income group as a percent of its mean income (either Income I or Income II).

$$\text{Net Benefit} = \frac{(\text{Benefit} - \text{School Property Tax Paid})}{\text{Income}} \times 100\%$$

Net Benefit Incidence of School Expenditure by Income Levels

What is tested here is the truthfulness of the statement that the net benefit incidence of school expenditure is progressive.[1] Nine income levels are considered, but as before, income levels in the $12,000 to $23,999 income range are pooled. The results are found in Table 6.4.

In Column 1 (based on Benefit I and Income I), farmers in the first income group, who received the highest gross Benefit I, had the highest net burden.[2] This implies that for the selected farmers in the study, the school property tax does not succeed in redistributing income to the farmers in the lowest income level. However, when Income I and Benefit II are used in the analysis, the results in Column 2 suggest that the net benefit incidence is clearly progressive. This finding is similar to the results of a study by Gillespie [Gillespie, 1964, pp. 180-181]. It may be concluded from the results in Column 2 that the provincial government's contribution is a tool for achieving income redistribution.

The results in Column 3 (based on Benefit I and Income II) indicate that farmers in the lowest income level had a net burden. The results in Column 3 do not support the statement that the net benefit (BI) from school property tax is progressive. Excluding income levels 2,5, and 6, where net benefits are obtained, the results suggest that net burden decreases with an increase in income. Apart

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[1] Progressive here means that the net benefit incidence decreases as income increases.

[2] We have net burden when Benefit minus cost is negative.

[3] The Gillespie study was based on all taxes.

TABLE 6.4

INCIDENCE OF NET BENEFIT OF SCHOOL EXPENDITURE BY INCOME LEVELS BASED ON INCOME I, INCOME II, BENEFIT I AND BENEFIT II[1]

Income Levels	Income I Net Benefit I (1)	 Net Benefit II (2)	Income II Net Benefit I (3)	 Net Benefit II (4)
	(%)	(%)	(%)	(%)
Less than $3,000	3.6[2]	-14.4[5]	1262.0[2]	-1282.0[5]
3,000 - 5,999	1.7	15.6	5.5	27.5
6,000 - 8,999	0.2	9.5	-1.7[4]	4.9
9,000 - 11,999	0.7	7.2	-1.3[4]	3.4
12,000 - 14,999	0.3[3]	3.1[3]	0.5	5.1
15,000 - 17,999			3.2	11.5
18,000 - 20,999			-1.2[4]	0.6
21,999 - 23,999			-0.8[4]	1.1
24,000 and over	-1.0[4]	0.3	-0.5[4]	0.9

[1] Net Benefit, Benefit I, Benefit II, Income I and Income II are defined in Appendix I.

[2] Since Education Benefit minus Education Cost is negative and income is also negative, the positive value obtained is a net burden. The smaller the value, the greater the net burden. (Net Burden is defined in Appendix I.)

[3] Income levels between the $12,000 and $23,999 income range are pooled due to insufficient observations for each level.

[4] Since Education Benefit minus Education Cost is negative and income is positive, the net value obtained is a net burden. The higher the value, the greater the net burden.

[5] Since Education Benefit minus Education Cost is positive, and income is negative, the negative value obtained is a net benefit. The smaller the value, the greater the net benefit.

Sources: Values taken from Appendix IX.

from income level 6, the results in Column 4 (based on Income II and Benefit II) show there is progression of the net benefit (BII) through the income levels.

The lower net benefit (BI) obtained in Column 1 (based on Income I) and Column 3 (based on Income II) suggest that the selected farmers paid more than the average school property tax and/or have less than the average number of farm children in elementary and high schools. The former suggestion seems more applicable since the average farm size in acres and agricultural real estate value in dollars exceeds the average farm size and agricultural real estate value in the study area.

The results of the investigation of net benefit, estimated from either Benefit I or Benefit II, illustrate how income distribution can be exaggerated when the measure of gross benefit is used. Comparison of results based on Income I (Columns 1 and 2) and Income II (Columns 3 and 4) also suggests that progressiveness of net benefit is exaggerated when measured on Income I (especially with Benefit II). This observation may explain the results obtained by Gillespie. It is concluded that the provincial contribution towards elementary and high school financing not only increases the net benefit from school expenditure, received by the selected farmers in the study, but also achieves a redistribution of income favorable to farmers in lower income groups.

Net Benefit of School Expenditure by Age

The objective of this analysis is to again test the hypothesis that net benefit of school expenditure is relatively favorable to the middle-aged farmers. Middle-aged farmers are defined in the study as those farmers between the ages of thirty-six and fifty years. As results in Column of Table 6.5 (based on Income I and Benefit I) show, with the exception of farmers between thirty-one and forty years of age who obtained net benefits (BI), farmers experienced a net burden. The frequent occurence of net burden may be attributed to the suggestion that

TABLE 6.5

INCIDENCE OF NET BENEFIT OF SCHOOL EXPENDITURE
BY AGE BASED ON INCOME I, INCOME II,
BENEFIT I AND BENEFIT II[1]

Age Levels	Income I Net Benefit I (1)	 Net Benefit II (2)	Income II Net Benefit I (3)	 Net Benefit II (4)
Years	(%)	(%)	(%)	(%)
Less than 31	-2.8[2]	-2.8[2]	-1.6[2]	-1.6[2]
31 - 35	1.0	10.7	0.3	3.6
36 - 40	0.9	11.7	0.4	4.6
41 - 45	-1.2[2]	22.0	-0.3[2]	4.7
46 - 50	-2.8[2]	14.8	-0.6[2]	3.3
51 - 55	-1.4[2]	6.1	-0.4[2]	1.6
56 and over	-3.0[2]	4.0	-0.4[2]	0.6

[1] Net Benefit, Benefit I, Benefit II, Income I and Income II are defined in Appendix I.

[2] Since Educational Benefit (either BI or BII) minus Educational Cost is negative and income is positive, the net value obtained is a net burden. The higher the value, the greater the net burden.

Sources: As in Table 6.4. (The above table is developed from Appendix X).

the selected farmers in the study paid more than the average school property tax paid by farmers in the study area. Results in Column 1 indicate, as with the gross benefit analysis, that there is redistribution of income from farmers over forty-one years old and under thirty-one years old to farmers between thirty-one and forty.

Inspection of the mean income column in Appendix X shows that farmers over fifty-five years old have the least mean income. Therefore, redistribution of income brought about by the school property tax paid and the benefit obtained from school expenditure financed with school property tax revenue results in the further reduction of the relative economic power of these farmers.

The results in Column 2 (based on Income I and Benefit II) reveal a large variation of net benefit (BII) by age groups. They suggest a greater redistribution of income towards middle-age farmers, especially from farmers in the oldest age level and farmers under thirty-one years of age.

The results in Columns 1 and 3 illustrate the importance of considering the tax incidence and gross benefit (BI) together in an investigation of changes in the relative economic positions of farmers by age groups. Farmers in age groups between forty-one and fifty years old, who are among the farmers with the greatest tax incidence and gross benefit, had net burden. That is, the tax incidence exceeded the gross benefit.

It is concluded from the results in Columns 1 and 3 that redistribution of income through school property tax and benefit from school expenditure is more favorable to farmers between thirty-one and forty years of age. The variation in magnitude of net benefit (based on Income II and Benefit II) in Column 4 is not very pronounced. This finding is a departure from the findings based on Income I and Benefit II (Column 2). Using Benefit II shifts the age range where the net benefit is relatively higher (in the case of BI in Columns 1 and 3) from the thirty-one to forty years of age range to the thirty-six to fifty years of age range (Income I in Column 2) and thirty-one to forty-five years of age range (Income II in Column 4). It is the provincial contribution towards financing elementary and high school education which brings about this change.

Net Benefit of School Expenditure by Location

Rural I and Rural II, the two locational groups, described earlier, are used. The objective here is to test the hypothesis that Rural II farmers receive a relatively higher net benefit. The results of this analysis are in Table 6.6.

Column 1 (based on Benefit I and Income I) and Column 3 (based on Benefit I and Income II) reveal that the selected farmers in the two study areas have a net school tax burden. The explanation formerly given for the occurence of the net school tax burden is applicable here.

TABLE 6.6

INCIDENCE OF NET BENEFIT OF SCHOOL EXPENDITURE BY LOCATION BASED ON INCOME I, INCOME II, BENEFIT I AND BENEFIT II[1]

Location	Income I		Income II	
	Net Benefit I (1)	Net Benefit II (2)	Net Benefit I (3)	Net Benefit II (4)
	(%)	(%)	(%)	(%)
Rural I	-0.2[2]	10.5	-0.1[2]	3.2
Rural II	-3.0[2]	7.4	-0.9[2]	2.3

[1] Net Benefit, Benefit I, Benefit II, Income I and Income II are defined in Appendix I.

[2] Net burden since Education Benefit minus Education Cost is negative.

Sources: Values taken from Appendix XI.

The results in Table 6.6 indicate that the statement that net benefit of school property tax is relatively higher for farmers in Rural I is true. This statement holds whether the analysis is based on Benefit I or Benefit II and/or Income I and Income II. It is observed from the results that (compare Columns 1 and 3 to Columns 2 and 4) the amount contributed by the provincial government (by way of the SFP) to municipalities to finance elementary and high school education reduces the variation in net benefit received by the selected farmers in the two areas.

From the results in Table 6.6, it is concluded that the provincial government's provision of money through the SFP is a tool for achieving income redistribution. The results of the net benefit analysis justify the need for investigating net benefit of a tax. For example, in the analysis of the incidence of gross benefit by location, the gross Benefit I (Income II) value for farmers in both Rurals I and II were 2.0 percent, while net Benefit I (Income II) for farmers in Rurals I and II were -0.1 percent and -0.9 percent, respectively.

A word of caution here is required. The observations made are limited to the selected farmers used in the analysis in this study. It is emphasized again that the net benefit results are less reliable than results of the tax incidence and gross benefit analyses since the limitations and errors are greater. The inability to account for external benefits of education is another limitation to be noted, especially when the results indicate that farmers under thirty-one years old have "zero" gross benefit and net burden.

References

Gillespie, W. Irwin. "The Incidence of Taxes and Public Expenditure in the Canadian Economy." *Studies of the Royal Commission on Taxation*. Ottawa: Queen's Printer, September, 1964.

CHAPTER VII

SUMMARY AND CONCLUSIONS

Study Area and Method of Study

The study area described approximately covers East-Central Alberta. Data for the study are mostly obtained from unpublished and published records of the Alberta Department of Agriculture, Alberta Department of Municipal Affairs, and Alberta Department of Education, as well as through correspondence with individual farmers and their municipal offices.

Ordinary least square regression is used to analyse the effect of property taxes on price of agricultural real estate in the study area. The analysis of the incidence of the property tax paid by farmers, the gross benefit gained from the portion of the property tax used in financing elementary and high school education, and net incidence of the school property tax are based on both Income I and Income II. Income I and Income II are derived for each selected farmer and the details of the derivations of Income I and Income II (obtained by the Weisbrod-Hansen model) have been outlined. Income I and Income II are current income and annual lifetime income, respectively.

Farmers are classified by income, age, farm type and location of the farm. The selected farmers used in the study are not representative of a cross-section of farmers in Alberta. They may be said to be representative of the thirty-six percent (approximately) of farmers who had gross farm sales of over $10,000 in 1971 (1970 data were used in the study). It should be noted that the inability to include off-farm income may contribute to making the incidence of property tax less progressive, proportional, or more regressive.

Relevant data required to investigate the ratio of market value of agricultural real estate per acre to assessed value of agricultural real estate per acre by income levels and age levels were not available. This part of the study is therefore limited to classification based on location of municipalities. Data necessary for the estimation of gross benefit and net benefit (or net burden) from the overall property tax were not available. The gross benefit and net benefit studies are limited to the school property tax.

Two concepts of benefit, Benefit I and Benefit II, described earlier, are used in the analysis in the benefit section of the study. The limitations associated with the income concept and the measures of benefits have been highlighted. A major assumption made in the study was that property taxes paid by farmers are not shifted to consumers of agricultural produce.

Summary of Results

The Relationship Between Property Tax and Agricultural Real Estate Prices

It is concluded in the study that property taxes are capitalized into lower agricultural real estate prices. The great extent of capitalization observed in the study may be due to the possibility that the interest rate used in capitalization in the study is lower than the interest rate farmers in the study area may use in capitalization. It is further deduced that property taxes may be used to control inflation of agricultural real estate prices.

Incidence of the Property Tax Paid

A major hypothesis tested in this study is that the incidence of property tax paid based on an income concept which recognizes benefits associated with asset holding (Income II) is more equitable than the incidence of property tax based on current income (Income I). The Income II concept greatly improved the economic position of the selected farmers from $5,845 based on Income I to $19,283 based on Income II. Thus, the use of current income (Income I) greatly understates the economic position of the selected farmers when compared with a measure of lifetime income (Income II) which incorporates the effect of asset holdings.

The incidence of the property tax paid is expressed as a percent of income (Income I or Income II). The incidence of the property tax paid by the selected farmers based on Income I and Income II were 11.7 percent and 3.6 percent, respectively. Thus it may be concluded that, using an appropriate income measure, the incidence of the property tax paid by the selected farmers is not relatively higher than that paid by non-farmers, as some studies suggest.

The results of the incidence of property tax paid by income levels (based on Income I and Income II) implied that the incidence of the property tax paid is regressive for selected farmers in the income levels within the less than $3,000 to the $11,999 income range. For farmers in income levels of over $12,000, the incidence of the property tax paid is proportional and the proportionality of the incidence is well marked when Income II is used.

The incidence of the property tax paid is found to be relatively higher for grain farmers and the disparity in the tax incidence becomes higher when Income I is used. Using the two income concepts, it is observed that the incidence of the property tax for the selected farmers is relatively higher for grain farmers and is least for livestock product farmers. It is concluded that the property tax is not neutral for the selected farmers, using either of the two income concepts.

The results of the incidence of the property tax by age groups based on both income concepts indicate that the tax incidence is greatest for the selected farmers between forth-one and fifty years of age (between 20.8 percent and 22.4 percent, based on Income I, and 4.6 and 4.8 percent based on Income II). Farmers fifty-six years old and over had the third highest incidence value and the least incidence value using Income I and Income II, respectively. It is inferred from these results that current income for the farmers in the study is not related to asset holdings.

The incidence of property tax paid by farmers in Rural II is relatively higher than for the selected farmers in Rural I. It is concluded from evidence in the incidence of the property tax section of the study that the inequity of the incidence of the property tax is reduced if the measure of the tax incidence is based on an income concept which takes into account the benefits from asset holdings.

Incidence of Benefit of School Expenditure--The gross benefit is measured as benefit of school expenditure (BI or BII) expressed as a percent of income (Income I or Income II) of an income or age group. The incidence of gross benefit of school expenditure by income levels based on Income I and Benefit I and Benefit II indicates that the incidence of gross benefit of school expenditure is progressive. Using Income I and Benefit I, it decreased from 9.6 percent for the selected farmers in the $3,000 to $5,999 income level, to 1.1 percent for those whose income exceeded $23,999. Using Income I and Benefit II it decreased from 23.5 percent to 2.4 percent.[1] The incidence of gross benefit using Income II is not as markedly progressive as when using Income I.

It is concluded from the results of the incidence of gross benefit by age using the two concepts of income and benefits that selected farmers above and below the thirty-six to fifty years of age range receive relatively lower gross benefit of school expenditure. It cannot be concluded that the farmers below thirty-one years of age did not receive gross benefit of school expenditure since external benefits are not considered.

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[1] Farmers in the first income level had negative income and the value obtained is not applicable. However, the gross benefit for these farmers is relatively higher than for other farmers.

The results of the analysis of gross benefit of school expenditure by location indicates that there are no differences in gross Benefit I and gross Benefit II (based on Income I) received by the selected farmers in Rural I and Rural II. Similar conclusions are reached when the analysis is based on Income II. It is concludedthat the mean benefits received by farmers in these two areas are proportional to their mean incomes.

It is also concluded that current income (Income I) exaggerates the progressivity of gross benefits of school expenditure and that the progressivity of these benefits should be attributed more to the SFP. Thus, the SFP is an effective tool for achieving income redistribution.

Incidence of Net Benefit of School Expenditure--This section attempts to consider the net redistribution effect of school property tax (through tax payment and benefit derived from school expenditure). The net benefit of school expenditure is the difference of benefit (BI or BII) and school property tax paid expressed as a percent of mean income (Income I or Income II) for an income group, etc.

The results of the incidence of net benefit of school expenditure by income levels (based on Income I and BI and Income II and BI) indicates that the assertion that net benefit is progressive through all income levels is not well-founded. It is concluded, contrary to the conclusions reached in the case of gross benefit, that the school property tax does not succeed in redistribution (net redistribution) of income to the selected farmers in the lowest income level. Using either of the income concepts and Benefit II, it is concluded that the SFP results in a redistribution of income favorable to farmers in the lowest income levels.

The incidence of net benefit of school expenditure based on Income I and Benefit I and then Income II and Benefit I indicates that net benefit is more favorable to the selected farmers between thirty-one and forty years of age. This observation justifies the need for unlimited investigation of relative economic positions of farmers brought about by tax and benefits from tax to the incidence of the tax paid and the gross benefit derived from expenditure of the tax revenue. Selected farmers in age groups between forty-one and fifty years, the age groups where the highest tax incidence and gross benefit were experienced, had net burden. The introduction of Benefit II in the analysis changed the pattern of incidence of net benefit of school expenditure. Selected farmers between ages thirty-six and fifty had a relatively higher net benefit, with farmers below thirty-one years and over fifty-six years experiencing the least benefit. The conclusion based on Benefit II is similar to conclusions for the incidence of gross benefit by age levels.

The net benefit received by selected farmers in Rural II is higher than for farmers in Rural I. This conclusion holds when the analysis is based on the four combinations of Income I, Income II, Benefit I and Benefit II.

It is inferred from the frequent incidence of net burden using Benefit I that the selected farmers did not on the average bear the full costs of educating their children.

It is concluded from the results that the inequity of the property tax is reduced when the measure of the incidence of the tax is based on an income concept which takes into account the benefits of asset holdings. The extent of progressivity of the benefits from school expenditure for the selected farmers is also reduced when Income II is used. The provincial contribution towards financing of elementary and high school education through the SFP is an effective tool for achieving income redistribution. The results based on the incidence of net benefit of school expenditure clearly show that measurement of benefit from tax revenue based on gross benefit is inappropriate. The relationship of the property tax paid by selected farmers and farm operating expenses for the reference groups have been investigated in Appendix XII and the results presented there suggest another way of determining the incidence of the property tax when other data are not available.

Conclusions reached for the selected farmers with respect to the analyses based on economic concept adapted from the Weisbrod-Hansen model are more appropriate since basic to an ability-to-pay approach to taxation is inclusion in the tax base of all increases in wealth.

The results of benefit of school expenditure dictate that if the tax incidence is considered in terms of ability to pay then it is questionable to base the measure of benefit of school expenditure on gross benefit.

Questions Posed by Conclusions Evident in the Study

What does the conclusion that property taxes are greatly capitalized mean to people involved in agriculture? A removal or reduction of the property tax rate, we may say, will benefit the grain farmer who has a relatively higher tax burden. At the same time, a removal or reduction of property tax would involve a considerable growth in capital values and therefore result in substantial gains for existing agricultural real estate holders. These developments involve income redistribution. In this study, a reduction of the property tax rate will benefit grain farmers and older farmers (farmers over fifty-five years old) who have the lowest average income (Income I) since they at the same time have the highest agricultural real estate. It should be noted that the selected farmers in the study are not representative of Alberta farmers. This suggestion may not improve income redistribution if low income farmers in the province have little agricultural real estate.

Any policy suggestion in this direction should also consider its effect on the agricultural industry. Can beginning farmers enter farming when prices of agricultural land are high? Again, the benefits from a tax reduction may be tied to the land. And, as the study shows, the income concept which accounted for benefits of asset holding greatly improved the economic power of the selected farmers with low current incomes (Income I). This observation leads to a suggestion that mechanisms should be developed whereby older farmers can obtain income from their assets during their lifetime without necessarily selling the assets.

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APPENDIX I

DEFINITIONS OF TERMS

Benefit I - is school expenditure per pupil obtained by dividing revenue realized from property tax for school purposes by a municipality by the total number of pupils in elementary and high schools in the municipality.

Benefit II - is expenditure per pupil obtained by dividing total school operational expenses for a municipality by the total number of pupils in both elementary and high schools. The revenue for financing total school operational expenses includes the revenue a municipality obtained from the School Foundation Fund Program (SFP), a Supplementary School Requisition (SSR) and other sources.

Gross Benefit - benefit from school expenditure expressed as percent of income.

Net Benefit (Net Burden or Net Incidence) - the difference between school property tax paid and benefit from school expenditure expressed as percent of income.

Net Farm Income - the value obtained by subtracting interest payments from Net Farm Earnings (see Appendix II for derivation of Net Farm Earnings).

Income I - is net farm income minus the opportunity cost of farm operator's net worth. This is a current annual income.

Income II - is the sum of Income I and annuity of a farm operator's asset holdings. Income II is an annual lifetime income.

Farm Types -

1. Grains - 51.0 percent or more of the total value of agricultural production obtained from the sale of grains, plus 1970 Canadian Wheat Board Payments and 75.0 percent of other receipts for field crops, such as Wheat Reduction Payments, PFAA payments, crop insurance, etc.

2. Livestock - mainly cattle, plus hogs and sheep, excluding farms qualifying as dairy; 51.0 percent or more of the total value of agricultural production obtained from the sale of cattle, hogs and sheep (including wool).

3. Livestock products - mainly dairy; (a) 51.0 percent of the total value of agricultural production obtained from the sale of livestock products and together with the sales of cattle and calves (and other livestock) amount to 51.0 percent or more of the total value of farm production.

4. Mixed farm - farms not qualifying for one of the farm types identified above.

Farm Operator - the person directly responsible for the agricultural operation of the farm.

Off-Farm Income - all income that is not net farm self-employment income. It includes wages and salaries, net non-farm self-employment income, income from government sources, interest, dividends and other investment income, retirement and other income.

Rural I - comprised of municipalities on the Edmonton-Calgary Corridor. Farmers in these municipalities are also grouped under Rural I.

Rural II - comprised of municipalities outside the Edmonton-Calgary Corridor. Farmers in these municipalities are grouped under Rural II.

Tax Incidence (or Burden) - property tax paid expressed as percent of income.

APPENDIX II

ALBERTA FARM BUSINESS ANALYSIS

FARM INCOME STATEMENT

OPERATOR'S CROP RECEIPTS
WHEAT BOARD PAYMENTS
OPERATOR'S LIVESTOCK RECEIPTS
OPERATOR'S LIVESTOCK PRODUCT RECEIPTS
OPERATOR'S OTHER FARM RECEIPTS

OPERATOR'S RECEIPTS

LANDLORD'S CROP RECEIPTS
LANDLORD'S LIVESTOCK RECEIPTS
LANDLORD'S MISCELLANEOUS RECEIPTS

LANDLORD'S RECEIPTS

TOTAL OPERATING RECEIPTS

CHANGE IN OPERATOR'S CROP INVENTORY
CHANGE IN LANDLORD'S CROP INVENTORY
CHANGE IN OPERATOR'S LIVESTOCK INVENTORY
CHANGE IN LANDLORD'S LIVESTOCK INVENTORY

ADJUSTED FARM OPERATING RECEIPTS

LESS GRAIN AND HAY PURCHASED
LESS LIVESTOCK PURCHASED
LESS LANDLORD'S LIVESTOCK PURCHASED
ADD PERQUISITES

VALUE OF FARM PRODUCTION

CAR EXPENSES
TRUCK EXPENSES
TRACTOR EXPENSES
COMBINE AND SWATHER EXPENSES
OTHER EQUIPMENT EXPENSES
BUILDING AND IMPROVEMENT REPAIRS
CROP EXPENSES
LIVESTOCK EXPENSES
FARM OVERHEAD EXPENSES[1]
HIRED LABOUR EXPENSE
SMALL TOOLS & EQUIPMENT
CASH RENT
SHARE RENT EARNED BY LANDLORD
ADJUST FOR SUPPLIES INVENTORY CHANGE
DEPRECIATION

TOTAL OPERATING EXPENSES

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[1] Includes property tax payment.

NET FARM EARNINGS

LESS INTEREST PAID

OPERATOR'S NET FARM INCOME

OPERATOR'S NET FARM INCOME IS THE RETURN TO THE FARM OPERATOR AND UNPAID FAMILY LABOUR, MANAGEMENT, AND EQUITY CAPITAL

STATEMENT OF OPERATOR'S ASSETS
(AT MARKET VALUE) AND LIABILITIES

OPERATOR'S FARM ASSETS BEGIN YEAR END YEAR

(1) TOTAL CURRENT AND WORKING ASSETS[1]

BUILDINGS AND IMPROVEMENT
LAND

TOTAL FIXED ASSETS

OPERATOR'S TOTAL FARM ASSETS

OPERATOR'S FARM LIABILITIES

SHORT TERM DEBT
INTERMEDIATE TERM DEBT
LONG TERM DEBT

OPERATOR'S TOTAL FARM LIABILITIES

OPERATOR'S EQUITY

PERSONAL ASSETS

FARM HOME
OTHER PERSONAL ASSETS

TOTAL PERSONAL ASSETS

TOTAL PERSONAL LIABILITIES

OPERATOR'S NET WORTH

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[1] Includes machinery, and equipment, livestock, grain and feed.

APPENDIX III

RELATION BETWEEN MEAN TAX ASSESSMENT AND INCOME LEVELS BASED ON INCOME II

Income Level	Frequency	Mean Income ($)	Mean Tax Assessment ($)
Less than $3,000	3	-26	11,770
3,000 - 5,999	6	4,204	7,358
6,000 - 8,999	7	7,396	9,224
9,000 - 11,999	2	9,316	14,980
12,000 - 14,999	9	14,024	6,652
15,000 - 17,999	5	16,712	8,018
18,000 - 20,999	6	19,447	11,247
21,000 - 23,999	11	22,282	11,847
24,000 and over	14	39,118	14,360

Source: Calculated from 1970 FBA data, Alberta Department of Agriculture and municipal offices in Study Area.

APPENDIX IV

INCIDENCE OF PROPERTY TAX BASED ON INCOME II AT ALTERNATIVE INTEREST RATES (r)

By Income	r = 7.91	r = 7.29[1]	r = 6.89
	(%)	(%)	(%)
Less than $3,000	116.3	*[2]	171.9
3,000 - 5,999	9.1	12.4	13.9
6,000 - 8,999	8.8	8.1	8.2
9,000 - 11,999	8.6	9.8	14.2[3]
12,000 - 14,999	3.0	3.1	3.0
15,000 - 17,999	3.3	3.1	3.1
18,000 - 20,999	2.6	3.4	4.8
21,000 - 23,999	3.5	3.4	2.2
24,000 and over	3.4	2.4	2.5
Farm Type			
Grain	7.7	8.3	8.8
Livestock	3.6	3.7	3.9
Livestock Product	2.2	2.2	2.3
Mixed	6.1	6.5	6.8
Location			
Rural I	3.0	3.1	3.2
Rural II	4.6	4.8	5.0
Age Level			
Less than 31 years	2.5	2.6	2.6
31 - 35	2.7	2.8	2.9
36 - 40	3.7	3.8	4.0
41 - 45	4.6	4.8	5.0
46 - 50	4.4	4.6	4.8
51 - 55	2.4	2.5	2.6
56 and over	1.5	1.6	1.6

[1] Used in study.

[2] Tax incidence is greater than next income level.

[3] Only one entry, not very reliable.

Sources: Calculated from the 1970 FBA data supplied by the Farm Management Branch, Alberta Department of Agriculture, Edmonton, tax records for the individuals supplied by municipal offices and data supplied by the selected farmers.

APPENDIX V

INCIDENCE OF THE SCHOOL PROPERTY TAX

By Income Levels	Incidence of Property Tax Based on Income I (%)	Incidence of Property Tax Based on Income II (%)
Less than $3,000	*[1]	*[1]
3,000 - 5,999	7.9	8.2
6,000 - 8,999	5.0	5.0
9,000 - 11,999	2.8	6.0
12,000 - 14,999		2.0
15,000 - 17,999	2.0	2.0
18,000 - 20,999		2.2
21,000 - 23,999		2.3
24,000 and over	2.1	1.5
By Age Levels		
Less than 31 years	2.8	1.6
31 - 35	5.5	1.8
36 - 40	6.3	2.5
41 - 45	14.4	3.1
46 - 50	13.2	3.0
51 - 55	6.2	1.6
56 and over	8.1	1.1
By Location		
Rural I	6.8	2.0
Rural II	9.6	3.0

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[1] The school tax burden for farmers in this income level is relatively higher than school tax burden for farmers in the second income level.

Sources: Alberta Department of Agriculture, Marketing Division, Farm Management Branch, Farm Business Analysis Data: 1970; Alberta Department of Municipal Affairs, Annual Reports and Municipal Statistics: 1970; Alberta Department of Education, the Sixty-Sixth Annual Report and Supplement.

APPENDIX VI

INCIDENCE OF GROSS BENEFIT OF SCHOOL EXPENDITURE BY INCOME LEVELS (BASED ON INCOME I, INCOME II, BENEFIT I, BENEFIT II)[1]

Income Levels	Number of Farmers	Mean Income	Mean Benefit of School Expenditure	Incidence of Gross Benefit of School Expenditure
		($)	($)	(%)
Benefit I and Income I				
Less than $3,000	25	-3,664	399	*[2]
3,000 - 5,999	11	4,183	400	9.6
6,000 - 8,999	8	7,250	397	5.2
9,000 - 11,999	8	10,250	358	3.5[3]
12,000 - 23,999	6	15,989	356	2.4
24,000 and over	5	34,857	367	1.1
Benefit I and Income II				
Less than $3,000	3	-26	165	*[2]
3,000 - 5,999	6	4,204	577	13.7
6,000 - 8,999	7	7,396	241	3.3
9,000 - 11,999	2	9,316	431	4.6
12,000 - 14,999	9	14,024	358	2.6
15,000 - 17,999	5	16,712	872	5.2
18,000 - 20,999	6	19,447	193	1.0
21,000 - 23,999	11	22,282	327	1.5
24,000 and over	14	39,118	396	1.0
Benefit II and Income I				
Less than $3,000	25	-3,664	1,060	*[2]
3,000 - 5,999	11	4,183	983	23.5
6,000 - 8,999	8	7,250	1,110	14.4
9,000 - 11,999	8	10,250	1,026	10.0
12,000 - 23,999	6	15,989	817	5.1[3]
24, 000 and over	5	34,857	837	2.4
Benefit II and Income II				
Less than $3,000	3	-26	824	*[2]
3,000 - 5,999	6	4,204	1,497	35.6
6,000 - 8,999	7	7,396	725	9.8
9,000 - 11,999	2	9,316	875	9.4
12,000 - 14,999	9	14,024	1,002	7.2
15,000 - 17,999	5	16,712	2,263	13.5
18,000 - 20,999	6	19,447	548	2.8
21,000 - 23,999	11	22,282	758	3.4
24,000 and over	14	39,118	949	2.4

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[1] Gross Benefit, Benefit I, Benefit II, Income I and Income II are defined in Appendix I.

[2] Mean negative incomes are obtained for farmers in this income level. The gross benefit values obtained are not applicable. However, the gross benefit for farmers in this income level is relatively higher than for farmers in subsequent income levels.

[3] Income levels between the $12,000 and $23,999 income range are pooled due to insufficient observations for each level.

Sources: Calculations by author based on data from Alberta Department of Agriculture, Marketing Division, Farm Management Branch, Farm Business Analysis Data: 1970; Alberta Department of Municipal Affairs, Annual Reports and Municipal Statistics: 1970; Alberta Department of Education, The Sixty-Sixth Annual Report and Supplement.

APPENDIX VII

INCIDENCE OF GROSS BENEFIT OF SCHOOL EXPENDITURE BY AGE LEVELS (BASED ON INCOME I, INCOME II, BENEFIT I, BENEFIT II)[1]

Age Levels	Number of Farmers	Mean Income	Mean Benefit of School Expenditure	Incidence of Gross Benefit of School Expenditure
		($)	($)	(%)
Benefit I and Income I				
Less than 31 years	5	14,374	*[2]	*[2]
31 - 35	11	4,659	300	6.4
36 - 40	11	8,684	629	7.2
41 - 45	16	3,382	447	13.2
46 - 50	10	4,198	436	10.4
51 - 55	6	6,695	326	4.9
56 and over	4	3,332	170	5.1
Benefit I and Income II				
Less than 31 years	5	25,239	*[2]	*[2]
31 - 35	11	13,940	300	2.2
36 - 40	11	22,249	629	2.8
41 - 45	16	15,759	447	2.8
46 - 50	10	18,796	436	2.3
51 - 55	6	25,937	325	1.3
56 and over	4	23,691	170	0.7
Benefit II and Income I				
Less than 31 years	5	14,374	*[2]	*[2]
31 - 35	11	4,659	754	16.1
36 - 40	11	8,684	1,561	18.0
41 - 45	16	3,382	1,231	36.3
46 - 50	10	4,198	1,173	28.0
51 - 55	6	4,695	825	12.3
56 and over	4	3,332	404	12.1
Benefit II and Income II				
Less than 31 years	5	25,239	*[2]	*[2]
31 - 35	11	13,940	754	5.4
36 - 40	11	22,249	1,561	7.0
41 - 45	16	15,759	1,231	7.8
46 - 50	10	18,796	1,173	6.2
51 - 55	6	25,937	825	3.2
56 and over	4	23,691	404	1.7

[1] Gross Benefit, Benefit I, Benefit II, Income I and Income II are defined in Appendix I.

[2] Farmers under 31 years of age have no children in either elementary or high schools and the method of computing the benefit gives the impression that these farmers receive no benefit from elementary and high school education.

Sources: Calculations by author based on data from Alberta Department of Agriculture, Marketing Division, Farm Management Branch, Farm Business Analysis Data: 1970; Alberta Department of Municipal Affairs, Annual Reports and Municipal Statistics: 1970; Alberta Department of Education, The Sixty-Sixth Annual Report and Supplement; and other information supplied by the selected farmers.

APPENDIX VIII

INCIDENCE OF GROSS BENEFIT OF SCHOOL EXPENDITURE BY LOCATION (BASED ON INCOME I, INCOME II, BENEFIT I, BENEFIT II)[1]

Location	Number of Farmers	Mean Income	Mean Benefit of School Expenditure	Incidence of Gross Benefit of School Expenditure
		($)	($)	(%)
Benefit I and Income I				
Rural I	50	5,453	363	6.7
Rural II	13	7,353	480	6.5
Benefit I and Income II				
Rural I	50	18,192	363	2.0
Rural II	13	23,475	480	2.0
Benefit II and Income I				
Rural I	50	5,453	945	17.3
Rural II	13	7,353	1,246	17.0
Benefit II and Income II				
Rural I	50	18,192	945	5.2
Rural II	13	23,475	1,246	5.3

[1] Gross Benefit, Benefit I, Benefit II, Income I and Income II are defined in Appendix I.

Sources: See Appendix VI.

APPENDIX IX

INCIDENCE OF NET BENEFIT OF SCHOOL EXPENDITURE BY INCOME LEVELS (BASED ON INCOME I, INCOME II, BENEFIT I, BENEFIT II)[1]

Income Levels	Number of Farmers	Mean Income	Mean School Property Tax Paid	Mean Benefit of School Expenditure	Incidence of Net Benefit of School Expenditure
		($)	($)	($)	(%)
Benefit I and Income I					
Less than $3,000	25	-3,664	530	399	3.6[2]
3,000 - 5,999	11	4,183	331	400	1.7
6,000 - 8,999	8	7,250	381	397	0.2
9,000 - 11,999	8	10,250	284	358	0.7
12,000 - 23,999	6	15,989	317	356	0.3[3]
24,000 and over	5	34,857	719	367	-1.0[4]
Benefit I and Income II					
Less than $3,000	3	-26	492	164	1,262.0[2]
3,000 - 5,999	6	4,204	346	577	5.5
6,000 - 8,999	7	7,396	366	241	-1.7[4]
9,000 - 11,999	2	9,316	555	431	-1.3[4]
12,000 - 14,999	9	14,024	284	358	0.5
15,000 - 17,999	5	16,712	335	872	3.2
18,000 - 20,999	6	19,447	428	193	-1.2[4]
21,000 - 23,999	11	22,282	503	327	-0.8[4]
24,000 and over	14	39,118	583	396	-0.5[4]
Benefit II and Income I					
Less than $3,000	25	-3,664	530	1,060	-14.4[5]
3,000 - 5,999	11	4,183	331	983	15.6
6,000 - 8,999	8	7,250	381	1,110	9.5
9,000 - 11,999	8	10,250	284	1,026	7.2
12,000 - 23,999	6	15,989	317	817	3.1[3]
24,000 and over	5	34,857	719	837	0.3
Benefit II and Income II					
Less than $3,000	3	-26	492	824	-1,282.0[5]
3,000 - 5,999	6	4,204	346	1,496	27.4
6,000 - 8,999	7	7,396	366	725	4.9
9,000 - 11,999	2	9,316	555	876	3.4
12,000 - 14,999	9	14,024	284	1,002	5.1
15,000 - 17,999	5	16,712	335	2,263	11.5
18,000 - 20,999	6	19,447	428	548	0.6
21,000 - 23,999	11	22,282	503	753	1.1
24,000 and over	14	39,118	583	949	0.9

[1] Net Benefit, Benefit I, Benefit II, Income I and Income II are defined in Appendix I.

[2] Since Education Benefit minus Education Cost is negative and income is also negative, the positive value obtained is a net burden. The smaller the value, the greater the net burden. (Net Burden is defined in Appendix I.)

[3] Income levels between the $12,000 and $23,999 income range are pooled due to insufficient observations for each level.

[4] Since Education Benefit minus Education Cost is negative and income is positive, the net value obtained is a net burden. The higher the value the greater the net burden.

[5] Since Education Benefit minus Education Cost is positive, and income is negative, and negative value obtained is a net benefit. The smaller the value, the greater the net benefit.

Sources: Calculated from data obtained from Alberta Department of Agriculture, 1970 Farm Business Analysis Data, 1970; Alberta Department of Municipal Affairs, Annual Reports and Municipal Statistics: 1970; Alberta Department of Education, the Sixty-Sixth Annual Report and Supplement; Municipal offices and selected farmers.

APPENDIX X

INCIDENCE OF NET BENEFIT OF SCHOOL EXPENDITURE BY AGE LEVELS (BASED ON INCOME I, INCOME II, BENEFIT I, BENEFIT II)[1]

Age Levels	Number of Farmers	Mean Income	Mean School Property Tax Paid	Mean Benefit of School Expenditure	Incidence of Net Benefit of School Expenditure
		($)	($)	($)	(%)
Benefit I and Income I					
Less than 31 years	5	14,374	398	*[2]	-2.8[2]
31 - 35	11	4,659	254	300	1.0
36 - 40	11	8,684	548	629	0.9
41 - 45	16	3,382	487	447	-1.2[3]
46 - 50	10	4,198	554	436	-2.8[3]
51 - 55	6	6,695	418	326	-1.4[3]
56 and over	4	3,332	270	171	-3.0[3]
Benefit I and Income II					
Less than 31 years	5	25,239	398	*[2]	-1.6[2]
31 - 35	11	13,940	254	300	0.3
36 - 40	11	22,249	548	629	0.4
41 - 45	16	15,759	487	447	-0.3[3]
46 - 50	10	18,796	554	436	-0.6[3]
51 - 55	6	25,937	418	326	-0.4[3]
56 and over	4	23,691	270	171	-0.4[3]
Benefit II and Income I					
Less than 31 years	5	14,374	398	*[2]	-2.8[2]
31 - 35	11	4,659	254	754	10.7
36 - 40	11	8,684	548	1,561	11.7
41 - 45	16	3,382	487	1,231	22.0
46 - 50	10	4,198	554	1,173	14.8
51 - 55	6	6.695	418	826	6.1
56 and over	4	3,332	270	404	4.0
Benefit II and Income II					
Less than 31 years	5	25,239	398	*[2]	-1.6[2]
31 - 35	11	13,940	254	754	3.6
36 - 40	11	22,249	548	1,571	4.6
41 - 45	16	15,759	487	1,231	4.7
46 - 50	10	18,796	554	1,173	3.3
51 - 55	6	25,937	418	826	1.6
56 and over	4	23,691	270	404	0.6

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[1] Net Benefit, Benefit I, Benefit II, Income I and Income II are defined in Appendix I.

[2] Farmers under 31 years of age have no children in either elementary or high schools and the method of computing the benefit gives the impression that these farmers receive no benefit from elementary and high school education.

[3] Since Educational benefit (either BI or BII) minus Educational cost is negative and income is positive, the net value obtained is a net burden. The higher the value, the greater the net burden.

Sources: See Appendix IX.

APPENDIX XI

INCIDENCE OF NET BENEFIT OF SCHOOL EXPENDITURE BY LOCATION (BASED ON INCOME I, INCOME II, BENEFIT I, BENEFIT II)[1]

Location	Number of Farmers	Mean Income	Mean School Property Tax Paid	Mean Benefit of School Expenditure	Incidence of Net Benefit of School Expenditure
		($)	($)	($)	(%)
Benefit I and Income I					
Rural I	50	5,453	372	363	-0.2[2]
Rural II	13	7,353	702	480	-3.0[2]
Benefit I and Income II					
Rural I	50	18,192	372	363	-0.1[2]
Rural II	13	23,475	702	480	-0.9[2]
Benefit II and Income I					
Rural I	50	5,453	372	945	10.5
Rural II	13	7,353	702	1,246	7.4
Benefit II and Income II					
Rural I	50	18,192	372	945	3.1
Rural II	13	23,475	702	1,246	2.3

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[1] Net Benefit, Benefit I, Benefit II, Income I and Income II are defined in Appendix I.

[2] Net burden, since Education benefit minus Education cost is negative.

Sources: See Appendix IX.

APPENDIX XII

RELATIONSHIP BETWEEN PROPERTY TAX PAYMENT AND FARM OPERATING EXPENSES

The property tax paid by a farmer expressed as a percent of his total farm operating expenses may be regarded as a measure of tax incidence. The purposes of this section are: (a) to identify the importance of property tax as a farm expense; (b) to find the relationship existing between property taxes paid and farm expenses by income level, by farm type and by location of the farm enterprise.

The average farmer paid a property tax of $685.00. The average total farm operating expenses for the selected farmers is $23,028.00. The average property tax paid by the selected farmers is 3.4 percent of the average total farm operating expenses for the selected farmers.[1] As a single farm expenditure item, the 3.4 percent value obtained is a relatively visible or felt amount. The variation in this value for the different farm groups gives an impression of its incidence.

Despite a commonly held belief that property taxes form an important part of operating costs for low income farmers, there is no clear relationship between property tax paid expressed as percent of farm operating expenses by income levels. The results in Table 1 suggest that the property tax paid, expressed as percent of farm operating

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[1] The value obtained is relatively small if compared with the five percent value obtained for the whole province in 1970 [Alberta Department of Agriculture: A Historical Series of Agricultural Statistics Alberta, 1974].

TABLE I

PROPERTY TAX AS PERCENT OF FARM OPERATING EXPENSES BY INCOME LEVELS BASED ON INCOME I

Income Levels	Number of Farmers	Mean Income	Mean Property Tax Paid	Mean Farm Operating Expenses	Property Tax Paid as Percent of Farm Operating Expenses
($)		($)	($)	($)	(%)
Less than 2,999	25	-3,664	824	23,483	3.5
3,000 - 5,999	11	4,182	518	16,322	3.2
6,000 - 8,999	8	7,694	586	32,315	1.8
9,000 - 11,999	8	10,259	456	14,888	3.1
12,000 - 23,999	6	15,989	488	27,130	1.9
24,000 and over	5	34,857	1,120	28,755	3.9

Sources: Calculations by author from 1970 FBA data and Farm Management Branch, Alberta Department of Agriculture and Municipal Officials in Study Area.

expenses is as high or higher for farmers in the highest income level than for those in the lowest income level. When farmers are grouped according to income defined as Income II, the property taxes paid by farmers expressed as percent of the farm operating expenses are somewhat less for farmers in the highest income level than for those at the lowest income level. However, the results in Table II are basically the same as those in Table I in that the property taxes paid by farmers expressed as percent of farm operating expenses is proportional by income levels. Thus it may be inferred from the results that, at least on the strength of selection of farmers used in the study, the belief that property taxes formed a greater percentage of farm operating expenses for farmers in lower income levels is not well founded.

TABLE II

PROPERTY TAX AS PERCENT OF FARM OPERATING EXPENSES BY INCOME LEVELS BASED ON INCOME II

Income Levels	Number of Farmers	Mean Income	Mean Property Tax Paid	Mean Farm Operating Expenses	Property Tax Paid as Percent of Farm Operating Expenses
($)		($)	($)	($)	(%)
Less than 2,999	3	-26	712	23,315	3.1
3,000 - 5,999	6	4,204	522	15,685	3.3
6,000 - 8,999	7	7,396	601	15,255	3.9
9,000 - 11,999	2	9,316	911	21,244	4.3
12,000 - 14,999	9	14,024	439	15,779	2.8
15,000 - 17,999	5	16,712	525	16,009	3.3
18,000 - 20,999	6	19,447	667	19,090	3.5
21,000 - 23,999	11	22,282	758	25,600	3.0
24,000 and over	14	39,118	924	37,091	2.5

Sources: See Table I on page 139.

When farmers are classified by farm type (grain, livestock, livestock products, and mixed), the property tax paid as percent of farm operating expenses is greatest for the mixed farm operators, followed closely by grain farmers, livestock farmers and lastly, livestock products farmers (Table III). The amount of average total farm operating expenses for the mixed farmers suggests that these are small farmers who operate extensive farms (average farm size is 1231 acres) with a relatively large assessable land, explaining why the tax paid formed a relatively high percentage of the total farm operating expense. When the tax incidence was measured on income in Chapter V, the grain farmers also bore about the same burden as the mixed farmers.

It is assumed that farmers (outside the Edmonton-

TABLE III

PROPERTY TAX AS PERCENT OF FARM OPERATING EXPENSES BY FARM TYPE

Farm Type	Number of Farmers	Mean Property Tax Paid	Mean Farm Operating Expenses	Property Tax Paid as Percent of Farm Operating Expenses
		($)	($)	(%)
Grain	8	1,178	27,424	4.3
Livestock	17	863	31,474	2.7
Livestock Products	31	456	19,271	2.4
Mixed Farm	7	704	14,132	5.0

Sources: See Table I on page

Calgary Corridor, Rural II) operate relatively extensive type farm enterprises. It is logical to hypothesize that property tax paid, expressed as percent of farm operating expenses, will be relatively higher for farmers in Rural II than for those in Rural I. Comparison of these percentages for Rural I and Rural II support this hypothesis. The property taxes paid are 2.5 percent and 4.6 percent of average total farm operating expenses for farmers in Rural I and Rural II, respectively (Table IV).

The difference between the two areas in the average total farm operating expenses is not as great as the difference in the property taxes paid. Moreover the average property tax paid in Rural II, $1,137, is of the same magnitude as the $1,178 paid by grain farmers. The different incidence of property taxes paid in the two areas may be explained by the effect of type of farming on the tax base.

The results of this analysis suggest that when farmers

TABLE IV

PROPERTY TAX AS PERCENT OF FARM OPERATING EXPENSES BY LOCATION OF FARM

Location	Number of Farmers	Mean Property Tax Paid	Mean Farm Operating Expenses	Property Tax Paid as Percent of Farm Operating Expenses
		($)	($)	(%)
Rural I	50	567	22,598	2.5
Rural II	13	1,137	24,685	4.6

Sources: See Table I on page

are grouped by farm type and location, rankings of incomes and farm operating expenses are closely related. Thus, when incomes data are not available, the incidence of the property taxes may be estimated using cost data.